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General Article

THE ETIOLOGY OF THE COMMONER EQUINE RESPIRATORY DISEASES IN RELATION TO RECENT INFLUENZA RESEARCH

A Short Historical Review*

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It may be judged from Dr. Andrewes' remarks that research into influenza has at last taken shape as a problem in comparative pathology. It is thus fitting that the progress of research at this stage should be registered in the course of a discussion at a meeting of this Section. Let me, therefore, in making the point I wish to bring out in my contribution, retrace some of the ground which has already been covered by Dr. Andrewes.

Having got their hand in, as it were, with this class of research in their well-known investigations into distemper in dogs, the workers at the National Institute of Medical Research, Hampstead, were fortunate enough to discover that the small animal, namely, the ferret, which had served them providentially in pursuing their enquiries into many features of the dog disease that would have been extremely difficult to elucidate if dogs only had been susceptible to infection, also contracted disease when it was inoculated—but in this case only when it was inoculated by the intranasal route—with the nasal washings of human influenza patients.

As has been said, the lesions of the ferret disease disclose no bacteria as likely causal agents; the disease is readily transmissible by means of filtrates; much has been learned about its immunological characteristics in the ferret (a subject I shall revert to later), but so far the natural host, namely man, of what is presumed to be the virus thus transmitted to the ferret has not been infected with material derived from the ferret disease. The further finding that the mouse can be infected with the ferret virus by intranasal inoculation, with the production of characteristic lung lesions, may well furnish the means of ready and economical quantitative estimation of virus in tissue material, and thus help to speed up investigation, after the manner in which the mouse has served so admirably in recent work on louping-ill in sheep or the guinea-pig in researches into foot-and-mouth disease.

I submit, however, that this work might have reached an impasse had it not been that concurrently a disease of pigs, well known in America since 1918 as swine influenza, was under investigation by Shope at the Rockefeller Institute. Shope, with Lewis, in a number of papers since 1931, has shown that the pig disease is a composite infection, with, as its primary exciting agent, a filter-passing virus, which alone produces merely a mild disease (that is, however, readily transmissible by contact); symptoms corresponding in severity with those of the natural disease can only be set up when the virus acts in concert with the bacterium, *Hæmophilus influenzæ suis*.

Shope's work, it must here be said, followed upon the discovery of the American veterinary workers, McBryde, Niles and Moskey, in 1928, that (1) the pig disease was an affection of the respiratory tract and the causal agent was not found in the blood; (2) the infective agent was readily demonstrable in the tracheal and bronchial mucus and in the nasal secretions of diseased pigs; (3) the disease could be readily transmitted by dropping suspensions of the tracheal and bronchial mucus or of the nasal secretions of affected pigs into the nostrils of healthy pigs, and in no other way.

I have found it necessary to repeat this much of the substance of Dr. Andrewes' remarks because, from a scrutiny of the relevant literature, it has been borne in upon me that the War and the circumstances arising out of the War must now be adjudged to have delayed probably for at least 15 years the course of research along the lines which now bid well to be fruitful of exact information upon the nature of the problem we have under discussion and which may indeed indicate the means of its effective solution. Such work as has been taken up in the intervening period has consisted mainly of exercises in pure bacteriology, which on the whole have been barren of results that

* A Contribution to the Discussion on "Influenza in Man and Animals" at a meeting of the Comparative Section of the Royal Society of Medicine, on February 27th, 1935, the opening paper having been read by Dr. C. H. Andrewes, National Institute for Medical Research, Hampstead. This review has already appeared in a slightly abridged form in *Proc. Roy. Soc. Med.*, 1935, May, Vol. 28, No. 7, p. 941.

can be said to be likely to be applicable to the control of the disease.

Now, just before the War, that is in 1912 and 1913, there was published in Germany in the organ of the German military veterinary surgeons a series of reports, the significance of which was grasped only by a few men in veterinary circles at the time, although their general purport would seem to have been well appreciated by the men who sponsored or actively prosecuted the work and who bear some of the most illustrious names in the realm of bacteriology, *viz.*, Koch, Gaffky, Löffler. The work does not appear to be well known and it is important that it should be brought to the notice of those interested in this subject.

These reports dealt with a common respiratory disease of horses which had been causing regularly, especially during the colder months of the year, very heavy losses annually in the remount depôts and mounted formations of the German army. This disease is well known to British veterinary surgeons as "equine infectious pneumonia" or "contagious pleuropneumonia," but, as has been stressed by the Dutch writer, Bemelmans (1921), it bears more points of resemblance to human influenza than does the other common form of equine infectious respiratory disease, the so-called "pink-eye" of British and American veterinary surgeons. "Pink-eye," however, is customarily referred to as influenza following upon the subdivision by Falke, in 1862, in a notable treatise, of the more common respiratory diseases of the horse that had previously been massed together under the common designation of influenza.

The "pink-eye" form of infection (the *influenza catarrhalis* of Friedberger, *pferdestaupe*, *rotlaufseuche*) was quite well known to the German workers mentioned and was even investigated by them as a separate part of their enquiry. It is well known that this commonly designated influenza often occurs in the form of extensive epizoötics which spread rapidly through stables and even large territories in a continuous wave. It can be readily transmitted from diseased to healthy horses by subcutaneous inoculation of blood. In 1909 Poëls, of Holland, showed that it could be transmitted by a carrier stallion to mares during coitus. Mares infected in this way afterwards spread the disease rapidly by contact to healthy horses kept in the same stables, presumably by the respiratory route. Berkefeld filtrates of infective semen proved virulent on inoculation.

In Poëls' case, the stallion transmitted infection by coitus for a period of six years. In another case, recorded by Bergmann (1913) in Sweden, a stallion communicated infection in the same way for six-and-a-half years. Vechiu (1926), in Roumania, has shown that the virus can be found in the saliva of infected horses for at least eight months after apparent recovery.

This form of disease is usually attended with only a low death rate. After an incubation period of two to twelve (usually four to seven) days, there is a sudden rise of temperature (104°-106°F.), which lasts with fluctuations for three to six days and then drops rather suddenly. During the febrile period, the horse shows marked prostration, muscular weakness, and incoördination of movements. The eyelids are swollen and the conjunctiva assumes a deep red to mahogany colour. Œdematous swellings are often seen in the subcutaneous tissues of the lower part of the trunk and in the limbs. The amount of nasal discharge and cough varies considerably, but in what is usually held to be a typical case it is not large. It is, however, not always easy to distinguish this disease from the other form to be considered, in which inflammatory changes in the respiratory tract are the pronounced feature.

In the extensive outbreak which swept across India in 1915, Williams records that in some localities, depending upon the general condition of the horses and other circumstances, the disease assumed a typical "pink-eye" or anasarcous form, whereas in other localities the symptoms were those of an acute catarrhal fever. In an epidemic which raged throughout South Africa in 1916, Theiler was unable, after careful examination, to decide as to which of the recognised forms of influenza he was dealing with.

The equine infectious pneumonia (*influenza pectoralis* of Friedberger, *brustseuche*), which is the condition I wish to bring especially to notice in my contribution, differs from the preceding condition mainly in that it comes to the notice of the practising clinician when the disease has reached the stage of a frank pneumonia or pleuropneumonia. It is also less rapid in its spread, which takes place by leaps, and the very high death rate caused by it makes it a disease of formidable economic importance to horse owners. It prevails only among horses kept in stables or otherwise in close confinement, especially during the colder weather, when working horses are usually stabled. The view has been expressed by competent veterinary authors that probably all cases of pneumonia in horses, including the apparently sporadic cases encountered by the clinician, are of this infectious type. The lung lesions differ from those of pneumococcus pneumonia in man in that they first make their appearance as widely scattered foci of mainly croupous inflam-

mation in the lung parenchyma, which show a marked tendency to early necrosis followed by gangrene. In many cases, there is enormous pleuritic effusion. *Post-mortem*, one finds, usually in pure culture, in the earliest foci in the lungs, the streptococcus (*Str. equi*) first described in these lesions by Schütz (1887)—a streptococcus which was for long afterwards believed to be the cause of the disease, but which does not differ from the kind usually cultivable from the submaxillary gland abscesses of young horses affected with the common equine infectious disease known as strangles. The French veterinary worker, Lignières, however, ascribed both this disease and the form already considered to *Pasteurella* infection, that is, to a group of organisms that had previously been demonstrated in the lesions by Babes. There is a large continental literature upon the possible rôle of these two organisms in the causation of equine infectious pneumonia. It is interesting to recall that Pasteur (1881) gave his attention to this disease. The horses belonging to the *Compagnie des Omnibus Parisiens* were suffering huge fatalities from it; he injected nasal discharge into guinea-pigs, which afterwards died, and he obtained from various organs pure cultures of an ovoid bacillus which he thought closely resembled that of fowl cholera. To the end of his days, however, according to a commentator, Pasteur was not "taken in" by this sort of result.

In spite of the considerable amount of work carried out to prove a causal relationship between the various cultivable micro-organisms and *brustseuche*, the disease could never be set up in horses artificially by these organisms, and all measures designed to protect horses by inoculation of any of the organisms or their products failed.

In 1900, therefore, the Prussian Ministry of War, alarmed by the heavy recurring losses caused by the disease, undertook official enquiries into its etiology. The experiments were entrusted first to the distinguished veterinarians, Ostertag and Tröester, but the outcome of their work was that they failed altogether to discover what was the natural mode of transmission. Koch was then commissioned by imperial decree to pursue investigations into the matter at his institute in Berlin, with the co-operation of the military veterinary authorities. Like his predecessors at the work, he concluded that all the cultivable bacteria, notably the streptococci, to be found in the lesions *post-mortem* could be dismissed as secondary invaders or accidental contaminants. He noted, however, that in a few cases which had run a hyperacute course no bacteria could be discovered in the lungs. He also carried out careful experiments to ascertain whether other animals or vermin played any part as carriers or vectors of the infective agent. He was unable to incriminate such carriers, and his second report, written by Gaffky (1911), concludes with the statement that the causation and mode of transmission of the so-called equine contagious pleuropneumonia remained an absolutely open question. After Koch's death (1910), Gaffky was commissioned to continue the researches at Koch's institute, and the two further reports which were submitted to the Minister for War were published later by Gaffky and Lührs (1913).

Having at their disposal a vast amount of animal material, they were enabled to observe closely the pre-pneumonic clinical phase of the disease, *i.e.*, what may be looked upon as the more typically influenzal phase, and to kill for inspection young horses exposed to infection by contact at any observed stage of their disease. Their conclusions were as follows:—

> (1) The initial lesion in the lungs is found in the smallest bronchi. At an early stage of the disease these passages are filled with a clear, yellowish, slimy exudate, which readily coagulates, and in the vicinity of these collections of exudate there are areas in the lung of dense cell accumulation and serous infiltration. In the lobules communicating with the occluded bronchioles, the lung alveoli are also distended with fluid contents which are rich in extravasated cells. Where these foci underlie the pleura, there is œdema of the sub-endothelial tissue, which is filled with a transparent gelatinous exudate. There is also at the commencement of the disease a marked infiltration of the interstitial connective tissue with œdematous fluid.
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> (2) Next, about the fourth or fifth day after the onset of fever, bacterial invaders, particularly streptococci, make their appearance and then produce the severe croupous and often hæmorrhagic lesions which lead to widespread necrosis.
>
> (3) Transmission as a rule takes place by contact from horse to horse, without the intervention of vectors.
>
> (4) The incubation stage is long—at least 16 days; it is usually between 20 and 40 days, but may be even longer.
>
> (5) The disease cannot be transmitted by parenteral inoculation of blood or diseased tissue pulp. On the other hand, transmission usually succeeds when the bacteria-free bronchial exudate which has been harvested during the early stages of the disease is rubbed into the undamaged surfaces of the nostrils and mouth.

The authors also write of the presence of bodies that bear some resemblance to inclusion bodies in the ciliated columnar cells of the affected respiratory mucosa.

The above conclusions would cover the work which had been accomplished until the end of 1912.

The issue of published reports then ceased and the work had to be discontinued abruptly with the declaration of war. During the War,

and for some time afterwards, as Lührs has since stated, the disease fell into relative insignificance because (as had been already observed in the German campaigns of 1866 and 1870-71) in the conditions of open-air field service, horses were remarkably free from the forms of respiratory disease which had seriously afflicted them in the conditions of peace-time maintenance. Nevertheless, it must here be admitted that at remount depôts and collecting centres, and particularly in the conditions of sea transport, respiratory disease was often a serious menace to the horses of the belligerents. A splendid opportunity was then afforded, it has since been felt, to continue observations upon this class of disease in horses, for it had come to be thought that it would only be when a State was prepared to loosen its purse strings, as in war-time, that it would countenance expenditure of the magnitude that was likely to be demanded for the solution of this grave problem in equine disease that had often been such a pressing one in times of peace. What was actually attempted in the way of research by the army veterinary services cannot be affirmed to be one of the many bright spots on their escutcheon. It was felt at the time by veterinary pathologists—having in mind what we then knew about the virus diseases that were familiar to us, like swine fever, African horse-sickness, cattle plague, most probably dog distemper (for veterinary pathologists never took really seriously the work that was done by other people just before the war incriminating *Bacillus bronchisepticus* as the cause of this disease, with the then striking recent history of swine fever before them) and even, at that time, foot-and-mouth disease—that the common equine respiratory affections were also most likely, if they were caused by viruses, to be caused by such as were restricted in their range of attack to the natural hosts in which they were found. The work that has been done subsequently with the virus diseases has, however, gone to show that one of the most profitable lines of enquiry is likely to come out of attempts to adapt the virus to a small susceptible laboratory animal in which the disease can be studied more conveniently. We have now heard from Dr. Andrewes what success in this direction has been achieved with human and pig influenza.

It is to be hoped that the respiratory conditions of the horse will prove amenable to study by methods similar to those which have proved profitable in the now well-known virus affections. I have dealt with the subject here as it concerns horses, not because of a desire at the present moment to press for an extension of the study to this species, but rather to bring to notice certain remarkable experiences in comparative pathology which seem to me to fit in very well with the picture as it has now been revealed by Dr. Andrewes. I would have hesitated, however, to make it the main theme of my contribution had it not been that there has fallen into my hands a most striking article written a few years ago by Gaffky's former colleague, Lührs (1925) (now a veterinary-general in the German Army) recording what he has been able to salvage of the German records covering the period between the end of 1912 (when the last report was published by Gaffky and him) and the outbreak of the War. This further report was not published until 1928, in a *Festschrift* dedicated to the distinguished veterinary teacher, Eugen Fröhner. Lührs tells us in this report that the researches carried out at Koch's institute under Gaffky were afterwards directed by Löffler, who deemed them to be of such great interest and significance that on his death-bed his concern was for them and their further extension.

The further records are concerned with researches upon immunisation against the equine infectious pleuropneumonia. In experiments that were several times repeated and seem to me to have been adequately controlled, it was shown again that when bronchial exudate, free of bacteria, taken from the lungs of young horses on the third or fourth day of their illness was applied to the nostrils or mouth of susceptible horses the latter almost invariably contracted disease. In their protection experiments, suspensions of triturated lung lesions were employed. It had been found that suspensions prepared in this way did not set up recognisable disease when they were inoculated subcutaneously, intravenously, intrathoracically or intramuscularly, but the inoculated animals subsequently resisted natural infection after they had been exposed to risks in every possible way. In view of these promising results, further work on a somewhat large scale was carried out using for the experiments mainly lung material preserved in 50 per cent. glycerine; the animals inoculated with this material subsequently resisted infection by intranasal and intrabuccal rubbing of infective bronchial mucus, which almost invariably produced disease in the controls. It is mentioned that the period of incubation was shorter when the infective material was rubbed into the nostrils than when it was rubbed inside the mouth.

The active agent would therefore seem to be unable to set up manifest disease save when it was brought into direct contact with the respiratory mucosa; when it was introduced into the body by other channels it failed to set up overt disease, but was yet capable of evoking an immunity response of such degree that the inoculated animal was capable afterwards of putting up nearly always a solid resistance against natural infection.

While dealing with the subject of equine respiratory affections, mention should be made of the recent work of Waldmann and Köbe upon a form of infectious bronchitis in horses which prevails seasonally in certain racing establishments in Germany and elsewhere and which causes the affected animals to display paroxysms of coughing, with few other striking symptoms. The disease has been found by these workers to be readily transmissible among horses by contact, the incubation period being from two to three days. It could also be transmitted artificially by intranasal inoculation of bronchial mucus and lung expressate derived from horses killed at an early stage of the disease, when the lungs were still germ-free. Filtrates of suspensions of this material were also infective, and the disease produced was passaged twelve times in this way by filtrates. In severe cases, streptococci could be discovered in the peribronchial foci. Some immunity to reinfection was demonstrable, the degree of which seemed to correspond to the severity of the initial infection.

The disease was also found to be transmissible to pigs and cattle. In cattle, the disease set up would appear to be identical with that seen in the small outbreaks of infectious bronchitis that have sometimes been reported to occur naturally in these animals. The authors did not determine whether the pig infection which was brought about experimentally by them with the horse virus was identical with the form of pig influenza which they have had under study for some time in Germany, following upon the suggestive indications of Shope. The German form of pig influenza seems to exhibit certain well-marked points of difference from the American disease studied by Shope. It prevails as an extremely widespread winter enzoötic among pigs of a few weeks old, in which formerly it was mistaken for chronic swine fever. It is manifested by great wasting and coughing, and it is noteworthy that the concomitant bacterial invaders change in kind with advancing age of the young pigs from *Hæmophilus* to *Pasteurella*. The disease cannot be reproduced in its natural form by intranasal inoculation of pigs with artificial mixtures of filtrates derived from affected lung and cultures of the concomitant organisms grown on laboratory media. It would seem that the bacteria lose their capacity to act in concert with the virus when they have been grown outside the body on culture media.

The horse disease investigated by Waldmann and Köbe is, they believe, identical with forms of respiratory affection that have been described under various names in the literature, and they consider that it may assume the clinical picture of an infectious bronchopneumonia, which again has gone under various names, when the requisite secondary bacterial flora are to hand to supplement the action of the virus. They believe it is different, however, from the two great classes of equine respiratory disease—*influenza catarrhalis* and *influenza pectoralis*—that have already been discussed in this paper. It is worthy of mention that Lührs failed to infect pigs with the bronchial exudates derived from the latter (*brustseuche*) class of disease, these exudates proving nevertheless highly virulent to young horses by intranasal application.

To revert, however, in conclusion, to the work last recorded by Lührs upon the German official investigations into *brustseuche*, we may be allowed, perhaps, at this stage in the progress of influenza research, to take under review the important findings upon the immunisation of horses communicated by him in the light of the recent statements bearing upon the same aspect of the problem that have been made by the workers at Hampstead, dealing with the immunity reactions of the ferret to their strains of presumed human influenza virus, and by Shope, dealing with the immunity reactions of the pig to the American swine influenza virus.

With all three viruses—human, horse and pig—we have, from the recorded evidence, agents which are only capable of producing overt disease when they are implanted upon the respiratory mucosa of a susceptible host. In their natural hosts, their pathogenic action may become greatly enhanced by the supervention of secondary bacterial invaders, to produce a composite and variable clinical disease picture. When these viruses are introduced into the body parenterally, *i.e.*, in any way other than by implantation on the respiratory mucosa, they fail to set up any clinically recognisable disease, but the animals so inoculated afterwards prove to be more or less resistant to natural attack of disease. This has been proved to be so with the horse and pig, and observations pointing to similar conclusions have now been recorded in ferrets subjected to experiment with the human disease. Although the immunity brought about may not be of very long duration, it is likely that it can be freshened up by repeated parenteral inoculation with the live virus. Attempts at protection against the natural disease by inoculation with products derived from the secondary bacterial invaders have failed both in horses and pigs.

One may be over-sanguine at this stage in expressing the hope that the means are probably now forthcoming for protection of the human subject in an analogous manner. The work of the Hampstead team has shown that ample virus can be obtained for any system of immunisation of the kind envisaged from

ferrets, which suffer severely from the "clean" virus disease (if, as is most likely, the virus contained in them is actually that of human influenza).

References

Bemelmans, E. (1921.) *Rev. Gén. Méd. Vét.*, **30**, 377 (see also for literature on equine infectious pneumonia.)

Gaffky. (1912.) *Ztschr. f. Veterinärkunde*, **24**, 65-76, 113-122, 161-176, 223.

Gaffky and Lührs. (1913.) *Ztschr. f. Veterinärkunde*, **25**, 1-11.

Köbe, K. (1934.) *Deuts. tierärztl. Wschr.*, **92**, 603 (swine influenza in Germany and literature).

Lührs. (1928.) *Festschrift Eugen Fröhner*, zusammengestellt von R. v. Ostertag, pp. 184-225. Ferdinant Enke, Stuttgart.

McBryde, C. N., Niles, W. B., and Moskey, H. E. (1928.) *J. Amer. Vet. Med. Assoc.*, **73**, 331.

Shope, R. E. (1932.) *J. Exper. Med.*, **106**, 575 (Immunity to Swine Influenza).

Theiler, A. (1918.) *Seventh and Eighth Reports, Director of Veterinary Research, Union of South Africa*, pp. 361-393.

Vechiu. (1926.) *Rev. Gén. Méd. Vét.*, **35**, 241 (see also for literature on "pink-eye").

Waldmann, O., and Köbe, K. (1934.) *Zbl. Bakt., I* Abt., Orig. **133**, 49 (Infectious Bronchitis in Horses).

Waldmann, O., and Köbe, K. (1935.) *Berlin tierärztl. Wschr.*, **51**, 2 (Infectious Bronchitis in Cattle).

Williams, A. J. (1923.) *Vet. Record*, **3**, 221.

INBREEDING OF SWINE

Among the research items in *Nature*, August 17th, we read that, contrary to the findings from various other experiments on inbreeding of pigs, Mr. R. E. Hodgson (*J. Hered.*, 21, No. 5) at the Experiment Station of the University of Minnesota has reached the conclusion that it is not injurious to the race. "Brother-sister matings of registered Poland-China swine were made for eight generations without any marked loss of vigour. The strains chosen appear to have been exceptionally free from deleterious recessive characters. The experiments began with six sows, the strain from one being used as an outbred control. Three of the inbred lines were lost in the first generation and a fourth in the second generation, due to reluctance to mate. Two new lines were started in 1926, one of which is now in the sixth and the other in the eighth generation. The difficulty in securing matings has been less since the fifth generation, and it appears that the strains can now be propagated indefinitely by brother-sister mating. A few anomalies have appeared, and some undesirable characters were segregated, including odd psychological and physiological sexual reactions. Evidence was obtained that differences in disposition, such as super-docility and wildness, are inherited. A substrain with yellow and another with white blotches was segregated from one line. Comparison with the non-inbred strain indicates that no vigour has been lost, but that segregation of vigour has taken place in some cases."

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Capsules intended to affect the speed of greyhounds were mentioned in Blackpool Court recently. It was stated that an analysis of the capsules showed the presence of caffeine, and that some "cachous," also for administration to dogs, contained chloral hydrate.

ROYAL SANITARY INSTITUTE CONGRESS

PROCEEDINGS OF SECTION D (VETERINARY HYGIENE)*

President's Address

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It is the privilege of the President of each section of this Congress to open the meeting with a short address. Obviously such an address must be an expression of the thoughts of the speaker, and if he has attended these meetings over a series of years, as it has been my pleasure to do, his thoughts must indeed be of happy memories. For I am sure you will all agree with me that the conferences in this section have in the past been very well attended by the principal groups of persons concerned with our work. These include local authority representatives, medical officers of health, sanitary inspectors, and members of the profession to which I have the honour to belong. Indeed, on at least one occasion I can recall that the members present actually exceeded the seating accommodation. That this sectional meeting should bring together groups of people outside our profession is surely a clear indication that their work contacts more than casually. There is a united purpose to serve the common good, to help each other by the discussion of our mutual difficulties, and to see in what particular line of work the public health services can be brought to a still higher state of efficiency than they are at present, which surely are the aims of the Royal Sanitary Institute. We may therefore, I think, justly conclude that this particular section is fulfilling the object for which it was brought into being.

The success of our work, that of furthering the interests of public health, is really dependent upon three factors: research into the causes and means of prevention of disease and disability, desire by the actual workers in public health administration to put into practical application the knowledge acquired, and, thirdly, the support given to these desires by the controlling authorities. If the results obtained by the public health services are in any measure to be commensurate with the large

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financial outlay, an active and sustained co-operation between these three groups is essential; for, after all, the value of knowledge, the only value of knowledge, is the extent to which it is applied.

No one can dispute the intense activity that is taking place in the sphere of research into the causes of disease, using the word "disease" in its widest meaning, and you who for the most part are actually applying the fruits of research, and I as one of the many teachers who have the unenviable task of attempting to keep in touch with day-to-day scientific discoveries, will surely have at least one thought in common. I refer to the contrast between the magnitude and extent of scientific discoveries and the comparative tardiness with which, in many cases, the knowledge acquired is applied; for is it not the case that scientific research is tending to run away from its application? Indeed, a cynic might suggest that it is running away from itself. One becomes awed, if not at times actually frightened, at the rate of progress of material scientific research, and perhaps regretful that research is ceasing to be an adventure, that it is losing its romance, and that it is becoming definitely and essentially a business undertaking. Whether or not this will be for the ultimate benefit of mankind remains to be seen.

One naturally realises that caution is required in accepting the research workers' findings, and especially in formulating laws based upon their *dicta*, because no public health law, no departmental intrusion into the mode of living of the people can do other than cause a certain degree of disorganisation, and possibly, if repeated reference is made to disease, to implant a morbid interest and even fear into the minds of the people.

The public health official's most valuable work is that which is never seen, and therefore never recognised. For instance, how many of those for whom you labour have the slightest inkling of the scrupulous care that is taken in ensuring for the people a safe supply, with one unfortunate exception, of food commodities? But satisfaction is to be found in the fact that the public so served has such confidence in the safety of the meat, fish, fruit and other supplies that they take their hygienic quality for granted, and that surely is as it should be; but, unfortunately the one exception to which I have referred is so glaring an example of the tardiness—one might be excused for saying criminal tardiness—in the practical application of scientific discovery for the purpose of improving the health of the public that it is overshadowing the good that is done; I refer, of course, to the unnecessary presence of the bacillus of bovine tuberculosis in the milk supply. So much has been said of the dangers attending the consumption of milk that the public has acquired a distaste for, and even fear of, this most valuable food. Such an attitude is, of course, repugnant to a public health official, and that those who attend these conferences are highly dissatisfied with the lassitude of controlling bodies in the past is evident from the resolutions calling for definite action against this needless and preventable disease, which you have forwarded from time to time to the appropriate quarters.

The main requirements of the people are sufficient food, sanitary housing and occupation, and unless these three are fully available to all classes of the community, public health administration cannot be said to be truly efficient. Sanitary housing for the people is outside the scope of the deliberations of this section, but in passing one may refer to the length of time that has elapsed between the acquisition of the knowledge that dwelling in slums has a detrimental effect on the health of the people and practical utilisation of the knowledge. The difficult problem of rehousing the less fortunate members of the community has, however, now been tackled with the courage the cause needs and deserves, and the result so far obtained has been such as to merit congratulations to those participating in the release of the unfortunates from their degrading surroundings. But the veterinary profession also has its housing problem, and though the association may not be clearly apparent, yet it is true that the first requirement of man—a sufficiency of food—is dependent in no small degree upon the housing and environmental conditions of our domestic animals; for is it not true that the cost of food is largely governed by the cost of production? And is it not also true that the cost of production of such essentials as milk and meat is unduly high because of the wastage due to disease among livestock? Housing and environmental conditions play an important part here, and undoubtedly much wastage could be prevented were more attention paid to the conditions under which our livestock, and particularly our young livestock, are kept. An efficient public health service should surely be concerned with the production of good cheap food as well as with the condemnation of food which is unfit for consumption. Indeed, the fact that large quantities of meat are condemned in an abattoir, while it may be evidence of the efficiency of the employees engaged therein, is really an indication of State inefficiency, for real progress in public health administration would be indicated by a steady reduction in the amount of meat condemned; there does not appear to be any evidence that such is the case. Significant facts can be obtained concerning this in the annual

reports issued by veterinary officers. For instance, in the report of the chief veterinary officer for the City of Edinburgh, Mr. A. Gofton, for 1933, it is stated that *post-mortem* statistics collected at the abattoirs during that year actually show a higher incidence in the occurrence of tuberculosis in dairy cows of the city and district than the average over a period of years. Considering the lengthy period during which we have had a reliable method for the detection of tuberculous infection and a highly-trained personnel capable of applying the test, is it not deplorable that of a total of 3,248 cows slaughtered, 1,457, or 44·86 per cent., were found to be affected with tuberculosis in some degree?

The housing scheme for animals began, and practically ended, with the institution and enforcement of rigid by-laws for the better housing of adult dairy cows, a large percentage of which are diseased. It seems to me that if more attention had been paid to the housing and environmental conditions of young stock and to the draining of the picturesque ponds into which cattle defæcate and out of which they drink, greater progress would have been made towards the foundation of healthy stock and the elimination of disease. While the campaign for the production of a cleaner milk supply has, of course, much to commend it, it cannot be said that it does more than touch the fringes of the real matter at issue—the supply of safe cheap milk. We do, however, know how this could be achieved—at least in part—and other States, less fortunately placed geographically, must envy us our great opportunity not only to rid our herds of disease but to exclude it from our shores. I have said that we could in part—perhaps in great measure—help in obtaining a satisfactory supply of milk to those who need it. But the eradication of bovine disease calls for three things: courage, money, and, may I say, a certain degree of impatience; if these three can be found, then there is hope for the future.

To-morrow you will have an opportunity of expressing your views on legislation dealing with this aspect of public health which has come into being since the last Congress was held. You will have an opportunity of considering whether in the near future the services of the veterinary public health official and the veterinary practitioners—for the practitioner takes a very active part in reducing the incidence of disease—will be utilised for greater true economy and efficiency than they have been in the past.

* Copies of this leaflet "The Handling of Meat in Small Refrigerators" may be obtained free on application to the Superintendent, Low Temperature Research Station, Cambridge.

Problems in the Preparation and Storage of Meat

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In the paper "Meat and Refrigeration" which I read at your Congress in Margate in 1930, I discussed the changes which take place during *rigor mortis* and how far deterioration in meat can be reduced by chilling and freezing. Since then the three most important developments that have been made in the handling of meat are (1) recognition of the need for extreme cleanliness in the slaughterhouse (in the bacterial sense), (2) the suggestion that there should be factory abattoirs in this country on the lines of the meat works and frigorificos abroad, (3) the gas-storage of meat. In this paper I propose to discuss, somewhat briefly, these three points.

Hygiene of the Slaughterhouse

In healthy flesh at death there are few or no bacteria. In one careful experiment the total count in one of the thigh muscles of a steer, three days after death, was 190 organisms per gramme of muscle. After a further 14 days at 41°F. it had increased to 237. The corresponding figures for a cow were 776 and 3,146 per gramme of muscle.[1] Bacteria on meat are mainly confined to the surface and are picked up during slaughter and dressing (from the gut, hooves, hide and swabbing water) and directly, during subsequent handling. In the case of home-killed meat experiment has shown that careless handling can reduce the life of meat from (say) 18 to seven days. The bacteria on the surface then show themselves as an unpleasant smelling slime in numbers corresponding to a figure of not less than about thirty million per sq. cm. If the meat has been stored in a butcher's box or refrigerator the bacteria in the main belong to the *Achromobacter* group and so far as is known they are not pathogenic. Nevertheless the meat is "repulsive to man" and quite rightly you condemn it.

I do not propose to discuss the experiments that have been made to prove and illustrate these points; they have been summarised in a report by two of my colleagues.[2] The practical problem of interest to the butcher is how to effect an improvement in the keeping qualities of his meat. In the case of the private slaughterhouse the elementary precautions that should be taken in order to reduce bacterial contamination have been summarised in a leaflet.*

(*Footnote at bottom of previous column.*)

The need for clean and careful handling of meat in the larger slaughtering units—the abattoir or meat works—has long been recognised, particularly in the frigorificos of South America where chilled beef is prepared for the English market. There, the animals before slaughter pass through a swimming bath and are well hosed with water to "lay" the dust. The slaughter-floor is at the top of the building and the paunch, hide, offals, etc., are thrown down chutes to the various floors below. The carcases are washed where necessary with clean water flowing continuously through brushes and are dried with sterilised cloths. The slaughter-floor and equipment is washed and disinfected daily. Nevertheless the last word has not been said as regards the lay-out and working of a slaughter-floor even in a large abattoir. Following on the work on the gas-storage of meat which I shall discuss presently, a considerable amount of investigation has been carried out in the Dominions, notably in Australia, to reduce infection on the slaughter-floor. The chief improvements made include the frequent sterilisation of knives and all instruments coming into contact with the meat, the provision of facilities to enable the slaughtermen frequently to wash their arms and hands, special clean overalls for the men, and the regular thorough cleansing of the slaughter-floor and chilling rooms. All this, however, would be futile without the interest and co-operation of the workmen, and in this connection I was particularly interested to read in a recent Ministry of Agriculture report dealing with the handling of milk[3] that the four essentials in order of importance necessary to obtain a clean supply are the mentality of the worker, light, water and steam. In the slaughtering of meat I would also add "adequate space for working," a point so often neglected in the modern abattoir.

No doubt most of you are saturated with lectures, papers and reports emphasising the need for extreme hygiene in the handling of milk. Nevertheless I see no reason why the slaughter and preparation and handling generally of meat should not be carried out with the same care and in due course public opinion will demand it.

Factory Abattoirs

In 1933 the Economic Advisory Council issued a report on "The Slaughtering of Livestock"[4] in which they contrasted the present system of slaughtering in this country as practised in private and public slaughterhouses with that carried out in the large meat works and frigorificos in America and the Dominions. On the grounds of economy in working and the greater yield in quality and quantity of by-products the Council recommended the erection of centralised slaughterhouses or factory abattoirs in this country and indicated the lines along which they should be developed. Last year a report on "Abattoir Design" was issued by a committee of the Ministry of Agriculture and Fisheries under the chairmanship of Sir Francis Boys[5] which considered in some detail the technical requirements of the factory abattoir as regards output, structure, lay-out and equipment. This report suggested that the normal minimum average output for a factory abattoir should be:—

	Daily.	Weekly. (4 days.)	Yearly.
Cattle	80	320	16,640
Sheep	480	1,920	99,840
Pigs	120	480	24,960
Calves	40	160	8,320

The report mentions that at present approximately nine-and-a-half million animals are slaughtered annually in the 16,000 private slaughterhouses in this country, which gives an average kill of about twelve head per week, *i.e.*, one beast, one calf, six or seven sheep and three or four pigs. Nevertheless the "minimum output factory abattoir" would be comparatively small beside the American frigorifico which may handle well over a million head per year.

There is no disputing the fact that the system of private slaughterhouses does not give the maximum yield of by-products in respect either of quantity or quality; it is equally true that the American meat works depends for its success not so much on the return from the carcases but on the value of the by-products. The first thing in fact that strikes the visitor is the eternal chase after fat and the efforts that are constantly being made to improve the methods of collecting the lower grade fats so as to transfer them to the first grade edible class. Even the drainage and washings from the floors runs into a "catch basin" and the scum is worked up for tallow. To justify the factory abattoir on economic grounds is, however, neither a problem for me nor the Royal Sanitary Institute.

The factory abattoir will be modelled on the lines of the large meat works abroad with lairage, inspection and sorting sheds, isolation block, slaughterhall with meat and offal inspection facilities, detention room, coolers, market hall, separate floors and sections for the handling and grading of by-products, boiler-house and engine-room, offices, etc. The general use of coolers will be new to this country. It is proposed to have a pre-cooler at 38° to 42° where the meat would hang for 24 hours to cool and set, followed (at the option of the owner of the meat) by storage in the general cooler at 38° to 40°F. The temperature of these coolers is higher than that in foreign and Dominion meat works (run usually at about 29°F.), but the Committee in suggesting these

temperatures had in mind (1) to reduce as far as possible sweating of the meat on removal from the store, (2) the fact that home-killed meat is not stored for such long periods as imported chilled meat. Ultimately, however, it is hoped that the butcher will require cold storage facilities for the prolonged hanging of his meat in order to improve its palatability, particularly its tenderness.[1]

Apart from sweating—a minor and over-rated defect—there is no argument against the cooling of meat by artificial refrigeration, whilst in its favour is the fact that the keeping qualities of the meat are considerably improved.

If and when factory abattoirs are introduced into this country it will mean in a sense "meat by mass production." However lamentable this may be from the sentimental point of view there is no gainsaying the fact that in these days in big industries quality and standardisation of quality are equally essential. As regards foodstuffs, perhaps the most striking proof of this is the growth of the New Zealand butter and cheese trades.

Gas-Storage of Meat

As you know, chilled meat is imported from South America, has an ocean journey of 21 to 25 days (at a temperature of 28° to 29·5°F.), and is in excellent condition up to 35 to 40 days after slaughter. Beyond this time it shows slime, mould and other signs of deterioration. In 1931 and 1932 we carried out experiments which proved that if the meat was stored in air containing carbon-dioxide the meat could be kept for much longer periods. The action of the carbon-dioxide is simple—it does not kill moulds and bacteria but it slows down their growth and multiplication. On the other hand, too much carbon-dioxide produces a chemical change in the hæmoglobin of the meat which spoils its "bloom." The concentration of carbon-dioxide must not exceed 20 per cent., and in 10 per cent. gas beef can be kept in first-class condition at 32°F. for 60 to 70 days. This discovery has modified the relative importance of the various meat-producing countries and the first result was the entry of Australia and New Zealand into the chilled beef trade with Great Britain. In the first full year (1934) these countries sent approximately 4,400 tons of chilled beef to Great Britain and the trade seems likely to increase very rapidly; thus from Australia alone in the third quarter of this year the quota of chilled beef has been fixed at 7,000 tons. The carriage of the meat requires gas-tight chambers—at first thought to be a difficult engineering task—but this problem has been solved and several ships have since been built with welded steel chambers, whilst the holds in a number of existing ships have been modified specially for this trade. The gas required in the holds is conveniently supplied from cylinders of liquid carbon-dioxide, while distance-reading instruments give the concentration of gas in the chamber and so tell the engineer when additional gas is wanted. The technique is simple, but further investigation is needed on the problem of "bloom"; at the moment the humidity and air circulation necessary to give the ideal condition of dryness at the surface of the meat have not been rigidly defined.

The prolonged storage of bacon is also important both from the point of view of smoothing out gluts and also in the case of imports from the Dominions. With bacon the main problem has been to prevent oxidation or rancidity in the fat, and this can best be done by storage in 100 per cent. carbon-dioxide. Under such conditions bacon can be stored successfully at 32°F. for several months and at lower temperatures for even longer.

It must be pointed out again, however, that the efficiency of carbon-dioxide in prolonging the storage life of meat depends upon how far it is possible to reduce bacterial infection at the slaughterhouse.

At the moment there are many claims for the use of ozone in the storage of meat, and in certain of the American and German abattoirs it is used in a concentration of one to two parts per million for the whole or part of the day. The trouble with ozone is that it is a powerful oxidiser and fats, particularly, are apt to develop an unpleasant linseed oil taste if given an overdose of the gas. Its value as a germicide in the storage of meat requires further investigation. Probably its greatest value is in the removal of undesirable odours, and it is said to be particularly useful, for example, in removing the smell of oranges from a chamber in which meat or any other foodstuff is to be stored.

In conclusion, it may be said that careful preparation and handling of meat, control of temperature and humidity, and now the use of gas-storage, has made the problem of the storage and preservation of meat a comparatively simple one.

References

[1]Moran, T., and Smith, E. C. "*Post-mortem* Changes in Animal Tissues. The Conditioning or Ripening of Beef." H.M. Stationery Office. Price 2s. 6d.

[2]Haines, R. B., and Smith, E. C. "Storage of Meat in Small Refrigerators." H.M. Stationery Office. Price 9d.

[3]"Studies concerning the Handling of Milk." *Ministry of Agriculture and Fisheries Bulletin No.* 31.

[4]Economic Advisory Council. "Report of Committee on the Slaughtering of Livestock." H.M. Stationery Office. Price 2s.

[5]"Abattoir Design." *Ministry of Agriculture and Fisheries Economic Series No.* 40. H.M. Stationery Office. Price 1s.

Dr. W. R. Wooldridge, M.Sc., M.R.C.V.S. (London School of Hygiene and Tropical Medicine), in opening the discussion on Dr. Moran's paper, said:—

Dr. Moran has once again given us a useful and apt discussion on certain problems associated with meat, and unlike many an essayist he has restricted himself to the field envisaged by the title. In this I hope to follow his excellent example although this will inevitably mean a certain amount of repetition.

Dr. Moran has begun his paper with a discussion of the hygiene of the slaughterhouse, but he might well have started with a reference to the rearing of the right type of animal. The importance of grading up the stock of the meat exporting country is well illustrated by the results achieved by the Argentine. The chilled beef obtained from this country now enjoys the reputation of coming only from the best of cattle, modelled on what was considered to be the best of all beef standards. As a result of this standardisation of both breed and feeding as well as the institution of an excellent veterinary service, one knows that the chilled beef imported from the Argentine is bound to be of a high quality. Furthermore, this standardisation to some extent facilitates both the handling and the storage of the meat. But public tastes change and we may perhaps question to-day whether this type of animal is the one most desired by the consumer in this country. Many butchers might assert that the only animal the consumer desires to-day is the hypothetical one consisting solely of "prime" joints and perhaps I might digress for a few moments in order to discuss this matter. For is not this demand merely the result of the policy of the butcher who makes little or no attempt to educate the public in the taste of good meat. It must be accepted as a sad fact in this country that very few housewives, or indeed caterers, would appear to possess the small amount of knowledge necessary to choose a tender piece of meat and this fact, coupled with the one mentioned the other day by our President, the Earl of Malmesbury, namely, the practically lost art of good cooking, results in almost complete ignorance of the taste of good and palatable meat. I suspect that this is the root cause of the popularity of vegetarianism to-day, for we must confess that there is little inducement for the individual to continue an omnivorous existence when meat is generally so unpalatable. The result is that those of the public who have the necessary spirit, without perhaps the knowledge to improve their meat food, follow the example of Bernard Shaw and turn vegetarian; whilst others with less spirit continue to eat the unpalatable product but to a much less degree than they might do were it more tender. Is it not, then, a short-sighted policy on the part of the producer and vendor of meat not to ensure that his wares are properly conditioned before he allows their sale? Once the public comes to recognise that really palatable meat can be obtained then the demand may be expected to increase considerably. It is pleasing to note therefore, that at last the desire for the institution at large abattoirs of a special cold room for hanging meat is fast becoming a popular one, with the result that nearly all modern schemes for abattoir design include such a room as an integral part.

But let us return to the discussion of the type of animal that may be considered as that most suited to the modern beef market. Nowadays the overriding fact is the small size of the family which naturally leads to an extended demand for small joints. This to some extent may account for the increased popularity in recent years of mutton and lamb, but is it not surprising that up to the present no real attempt has been made to exploit beef prepared from the smaller breeds of cattle? The fact that at present it usually takes three or four years for Highland cattle, Dexters and Galloways to reach full maturity whilst the Aberdeen Angus and Shorthorns mature in 18 months to two years is no real argument against a policy to develop the former beef breeds. In fact, it is not unlikely that with specialised breeding and perhaps some crossing with Shorthorns the time necessary for these smaller animals to mature could be considerably reduced. At any rate, the demand for small beef is not likely to lessen and it would appear that the fact will probably become one of the more important problems associated with the production of beef. It might be noted, in passing, that the mutton industry has already felt the influence of this demand for small joints and that now, for example, the large Border Leicesters are much less popular than heretofore, this breed being commonly crossed with breeds of smaller type to produce joints of the required size. A third problem associated with the preparation of meat is that of ensuring that it is produced only from the healthiest of animals. This problem can, of course, be readily solved by an efficient service of veterinary officers and meat inspectors, but it is a remarkable fact that whilst we, as a country, insist on a high standard of efficiency in the meat inspection services of the great exporting countries we ourselves make little attempt to control effectively the slaughter of our own animals for food. This policy is not only stupid but savours of hypocrisy. It not unnaturally annoys the producer in the countries from which meat is imported and at the same time it tends to lessen the demand for home-killed meat. Little thought is usually paid to this effect of our policy, but whilst the public realises that it is still possible to slaughter animals for food without either these animals or their carcases and organs undergoing efficient examination, it will not unnaturally tend to be suspicious of the home-killed product. To say this is not to belittle the valiant efforts made by our present meat inspection services, but it is obviously impossible for any person—whether he be sanitary inspector, medical officer or veterinary officer—to see every animal both before and after slaughter when his district may cover anything up to 100 square miles and include a large number of scattered small slaughterhouses. As Dr. Moran hinted, it is certainly impossible, without very large staffs, to inspect all animals both before and after slaughter as long as there are 16,000 private slaughterhouses in this country. The essayist further pointed out the economic absurdity of continuing this system and the desirability of changing it for a system of factory abattoirs where by-products will not be lost and the maintenance of hygienic conditions of slaughter will be easier. When this hygienic production of meat, together with its efficient examination both before and after slaughter is an accomplished fact, then will the public demand for home-killed meat again expand. It is essential, however, that these factory abattoirs should be models of cleanliness and hygienic meat production in the way Dr. Moran has indicated and should have every

facility for the examination of the animals before slaughter and the carcases and offals subsequently. Many of us probably think of a great city whose official abattoir is a perfect disgrace from this point of view both to itself and to its public. The few of its public that do gain admittance to its precincts come away with feelings of nausea in spite of the fact that a very efficient system of meat inspection is in vogue at this abattoir. This is mainly, I think, the result of inappropriate buildings.

Dr. Moran has indicated the recent improvements made abroad to reduce the infection on the slaughterhouse floor—the frequent sterilisation of all instruments and swabs coming in contact with the carcase, plentiful water supply, adequate space for working, etc. I should like to support him in his plea for extending these practices to our own country. It would be interesting to have figures to show the greater cleanliness of the metallic tubes and spray brush as compared with even a frequently changed swab. With the latter there is always the danger of the water being unchanged or the swab becoming badly contaminated in its early life, and thereafter spreading the infection, whilst one might expect the spray brush with its continuous flushing to remain comparatively clean. A further point that is stressed in this opening paper is the necessity for educating the meat worker in the principles of meat hygiene so that he may be able to take a sympathetic interest in the steps being made to reduce infection from human sources. In this way greater success is likely to result from measures designed to this end. There will remain, however, the possibility of carcases becoming infected with pathogenic bacteria obtained from human carriers. This danger may be increased by the recent practice of storing meat in an atmosphere of 10 per cent. carbon dioxide, for it has been shown that many bacteria, *e.g.*, *Brucella abortus*, meningococci, and the gonococcus actually grow better in this concentration of carbon dioxide than under ordinary atmospheric conditions. The danger, I think, is slight, but it seems to me advisable to carry out experiments with such bacteria and others that may be derived from human sources, to see what happens when they are painted on to the surface of meat and subsequently stored in an atmosphere of 10 per cent. carbon dioxide. The probability is that little or no growth will take place because of the second factor, namely, low temperature governing the storage. I am not in any way suggesting that 10 per cent. CO_2 is not beneficial in storing meat, but I should like to ask Dr. Moran whether he has any explanation to offer with regard to these opposing facts, or in fact, whether he has any idea how the carbon dioxide really exerts its effect. With regard to ozone, I hope that experiments will be made to compare the relative merits of this gas and of carbon dioxide as an adjuvant in the gas storage of meat. As far as one can tell, the Germans are perfectly satisfied with the ozone method and as so little of this gas is required it might prove even more economical than carbon dioxide.

Strictly speaking, the title of this paper would cover such other matters of the preparation and storage of meat as salting, pickling, smoking and drying. As it is doubtful whether it was intended that these should be discussed I shall only add that the hygienic handling of the meat and utensils used in these processes is just as important as it is for the fresh and the cold storage meat. Most of us will agree that there is probably some room for improvement in the handling of salted, smoked and dried meat after its processing. Turning to tinned meat, there could perhaps appear to be less necessity for these rigid hygienic precautions as presumably all contaminating organisms will be killed in the actual processing. On the other hand, the excuse that because organisms are subsequently killed they may be allowed free access to a food commodity is a dangerous one and one that cannot be countenanced by any body that has to guard the quality of food whether it be meat or milk, that is to be sold to the public. So it is essential that for whatever purposes meat is being prepared it should be handled throughout with the utmost care and cleanliness, and should be obtained from only the healthiest of animals.

In conclusion, perhaps I may be allowed to refer to one other influence which, at times, seems to me to complicate unnecessarily the problems associated with the preparation and storage of meat. I refer to the unfortunate lack of harmony which at times develops between the three branches of our meat hygiene services. Such conflict, besides being absurd, must result in inefficiency somewhere in the service. To a sympathetic outsider like myself, who has an intimate knowledge of the training of the students for at least two of these professions, it would seem to be reasonably possible, if good-will is there, for all three branches to work well together and for a highly efficient national service to be built up. As a contribution to this end these congresses of The Royal Sanitary Institute would appear to take pride of place.

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A General Review of the Legislation dealing with the Public Health Aspect of the Milk Supply

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It is not intended to deal with recent legislation in detail, but it is proposed rather to discuss the bearing of the legislation upon problems of a public health nature connected with the milk supply, and to do so in more or less general terms in the hope that in this way a fairly wide field will be opened for discussion.

The ultimate aim of milk legislation is to ensure that all milk is pure, wholesome (as judged by its chemical composition), and free from disease organisms either of bovine or human origin; and yet procurable at a price which will allow its use by all classes of consumers without prejudicing the price to the producer.

Legislation dealing with the public health aspect of the problem is contained in the following Acts and Orders:—

England.—The Milk and Dairies (Consolidation) Act, 1915; The Milk and Dairies Order, 1926; The Milk (Special Designations) Order, 1923; The Tuberculosis

(Attested Herds) Scheme (England and Wales), 1935.

Scotland.—The Milk and Dairies (Scotland) Act, 1914; The Milk and Dairies (Scotland) Order, 1934; The Milk (Special Designations) Order (Scotland), 1930; The Tuberculosis (Attested Herds) Scheme (Scotland), 1935.

England and Scotland.—The Milk and Dairies (Amendment) Act, 1922; and the Milk Act, 1934.

The regulations mentioned do not make any provision for the chemical standard of the milk except that in Scotland the Milk (Special Designations) Order lays down a 3·5 per cent. standard of butter-fat content for graded milk. It is not proposed to deal with the chemical standard of milk, as it is not essentially a public health question, but rather to consider purity and freedom from disease infection.

An endeavour to procure pure, clean milk is made in the Milk and Dairies Acts and Orders by assuring that producers are registered and that their premises and methods of production conform to certain standards. Powers are also given for the inspection of dairy premises and of dairy cattle. Later, the Milk (Special Designations) Orders provided standards of purity, as judged by the general bacterial content and content of coliform organisms of the special grades of milk—Certified, Grade "A" (T.T.), Grade "A" and Pasteurised.

There is no doubt that in general the quality of the milk supplied in this country has been greatly improved during the last two decades, and it has been shown that it is possible to produce clean milk in premises which are not of a very high standard, provided the methods adopted for its collection are sound. At present, under the Accredited Herds Scheme, the Milk Marketing Board in England intends to offer a bonus to producers who can maintain the Grade "A" standard, and it is difficult to imagine that the inducement offered will fail to bring about a substantial increase in the number of producers who are providing clean milk. In Scotland, the Milk Marketing Board has under consideration a method of payment for milk on a basis of cleanliness as judged by the bacterial content.

The cleanliness of milk is definitely important, but it is not necessarily highly so from a public health point of view. Dirty milk may keep only for a very short time, yet it may contain nothing which is injurious to the consumer. It is true, however, that dirty milk collected with careless methods is more likely to contain incidental organisms which may be dangerous or which may be the specific causal agents of a disease which is communicable to man. For instance, in those (fortunately rare) cases of "food poisoning" which have been traced to milk, the infection of the milk by organisms of the typhoid-paratyphoid group has not infrequently reached the milk from the fæces of the cow which is suffering from enteritis;[1] although it is also true that in some instances the organism associated with the outbreak has been recovered from the cow's udder and has been introduced directly from it to the bulk supply. Tuberculosis infection may also reach the milk from the fæces, urine or uterine discharge, etc., of an infected cow.

Epidemics of disease originating from milk are not very common. The bulk of them originate from human sources and may reach the milk directly without any intermediate agent, or may reach the milk by being first passed to the cow without causing disease in that animal; the latter type of case[2] may arise, for instance, in diphtheria by an infected dairy worker infecting a sore on the cow's teat where the organisms are harboured and incubated, and the disease is eventually spread. This infection reaching the milk directly or indirectly from human sources is primarily a medico-sanitary problem which is concerned chiefly with the health of the dairy worker, and as such I cannot attempt to deal fully with it; but it must be looked upon in this light and the cow must not be indicted as a gross offender, although at times she may be the unfortunate scapegoat.

That the milk supply should be free from disease is the chief essential to the consumer. The Milk and Dairies (Scotland) Act prohibits the use of milk from any cow suffering from tuberculosis with emaciation or tuberculosis of the udder, or which is giving tuberculous milk; or suffering from any sore on the teats accompanied by suppuration or bleeding; or suffering from any disease liable to infect or contaminate the milk. The Milk and Dairies (Consolidation) Act prohibits the use of milk of cows suffering from (in addition to tuberculosis) acute mastitis, actinomycosis of the udder, anthrax, foot-and-mouth disease and suppuration of the udder; the Milk and Dairies Order, 1926, adds cows suffering from any infection of the udder and teats which is likely to convey disease, any comatose condition, and any septic condition of the uterus.

The diseases from which cows suffer, and which are most important to those responsible for the control of the milk supply at present, are mastitis, contagious bovine abortion and tuberculosis. It is less likely that anthrax and foot-and-mouth disease may reach the milk supply, and in any event the Orders, made under the Diseases of Animals Acts, dealing with these diseases are sufficient to control the diseases, and consequently to safeguard the milk supply. Non-specific ailments such as

metritis and retained fœtal membranes, suppurating conditions of the udder and teats, etc., may also infect the milk supply; such infection is certainly a potentially dangerous one, although it is exceptional for it to give rise to any specific disease. Routine inspections under the Milk and Dairies Acts and Orders have gone far to reduce infections such as those mentioned, for the educative influence which is brought to bear on the dairyman is gradually making him realise that milk from such cows, and cows suffering from mastitis, is potentially dangerous and may also prejudice the keeping qualities of his milk.

Mastitis.—The use of milk from a cow affected with actinomycosis of the udder is specifically prohibited in the Milk and Dairies (Consolidation) Act. This is an extremely rare condition, and the possibility of infection to man is proportionately remote. Tuberculous mastitis will be mentioned under tuberculosis. Mastitis may be caused by many different types of organisms, among which the most important are streptococci, staphylococci, *B. pyogenes*, and organisms of the coliform type. In an investigation[3] carried out by the Research Institute of Animal Pathology in the Royal Veterinary College (London), of 1,600 cows, representing 30 herds, 660, or 40 per cent., were found which showed definite infection, usually of a latent nature, and in at least one quarter of the udder. In Germany, Seeleman[4] examined milk from 7,691 cows in 173 herds, and found that 33 per cent. of the cows were certainly infected. It would appear, then, that a large proportion of cows is affected with mastitis, probably in the region of 30 per cent. The presence of milk from infected cows in a bulk supply will prejudice the use of such milk, and probably also prejudice its keeping qualities. Certain types of organisms may be dangerous, particularly the hæmolytic group of streptococci, which on occasion may have reached the cow from a human source. In 82 clinical cases of streptococcic mastitis, Minett and Stableforth[5] found 13 excreting hæmolytic streptococci. However, milk which is altered in appearance and produced from udders showing clinical signs of mastitis is not often included in the bulk supply; it has already been mentioned that dairymen are gradually coming to realise that such milk must not be used for human consumption.

Contagious Bovine Abortion.—Many workers have examined samples of milk for *Br. abortus*, and it is obvious that a large percentage of our milk supplies contain the organism. For instance, Beattie[6] found that 19·8 per cent. of "raw" milk and 34·5 per cent. of "retailed" milk samples obtained in Edinburgh contained *Br. abortus*. "Raw" milk came from a single source and "retailed" milk often comprised milk from more than one source. Smith,[7] in Aberdeen, found 28·3 per cent. of samples of raw milk contained the organism, and Barratt[8] found 21·7 per cent. of samples of ordinary milk collected in Norwich contained the organism.

In England and Wales[9] the number of cases of undulant fever for the last few years is:—

1926	2
1927	6
1928	5
1929	17
1930	29
1931	40
1932	60
1933	58
1934	44

The numbers for recent years should be regarded as provisional, as cases are often reported several years after their occurrence. The number of cases for the years before 1926 is very small and is of small significance.

In Scotland[10] the number of cases of undulant fever for the last few years is:—

1929	3
1930	10
1931	13
1932	24
1933	23
1934	24
1935 (part)	7
Year not determined	1

From the figures quoted it is obvious that the disease is rife in the dairy herds of Great Britain, and that the milk from infected herds contains *Br. abortus*. However, the number of cases of undulant fever does not seem to bear any direct proportion to the infection of the milk. Whatever may be the reason for this, it would seem that while there is no need to clamour for specific power to deal with this disease from a public health point of view, the absence of an urgent call on the part of agriculturists for further measures for the control of contagious bovine abortion in cattle is nothing short of amazing.

Tuberculosis.—There is no doubt that bovine tuberculosis is by far the most important infection which may be conveyed to man by milk. It is believed that 40 per cent. of cows are affected with tuberculosis[11] to some extent; the actual extent of tuberculous mastitis, based on numerous observations of different individuals, appears to be ·5 per cent. or thereabouts, and when the number of animals which produce milk which has been infected with tuberculosis by contamination with infected fæces, urine, uterine discharges, etc., is added, the percentage of cows giving tuberculous milk probably more nearly approximates 1 per cent. Such animals are not distributed evenly over the herds of the country, but roughly speaking 7 to 10 per cent. of farm milk supplies contain the organism.

In order to protect the milk supply as far as possible several items of legislation are in force.

In the Milk and Dairies Acts it is laid down that no milk shall be sold from a cow suffering from tuberculosis of the udder, etc. Under this provision of the Acts it was quite competent to prohibit the sale of such milk, but nothing could be done to put the cow definitely out of production. Then came the Tuberculosis Order, which gave powers for the slaughter with compensation of such animals, and it was possible to control the cow immediately after she was detected. This Tuberculosis Order has been so often wrongly maligned that I cannot refrain from saying something in its favour. Besides this very necessary power which it gave for the disposal of dangerous animals, its working over a number of years has had a very definitely beneficial effect by its educative influence on the farmer, and also by bringing home to the public health official the fact that tuberculosis in our dairy herds is a real menace and a problem which requires strenuous and early steps for its control. The Order must be looked upon more as a corollary to the Milk and Dairies Acts than as a measure attempting to control or eradicate bovine tuberculosis.

It is obvious that an Order which provides for the removal of clinical cases of tuberculosis only, will never control the disease in bovines or completely prevent infection of the milk supply. When frequent inspection of dairy herds is carried out under the provisions o the Milk and Dairies (Scotland) Act one has found frequently that the cows have been examined carefully and conscientiously and no tuberculosis was suspected, yet a biological test of a bulk sample of milk from the farm showed that somewhere in the herd was a cow which was voiding active organisms of tuberculosis in her milk. Not only is that so, but often it has been found that samples from groups of cows have been procured and a group of cows incriminated by the biological test of the milk, and still no clinical symptom of tuberculosis was to be seen in any of the cows of the group; only after the examination of samples of milk from each cow in the group could it be shown which was indeed the culprit. Actually, then, a cow may be a danger to the consumer by virtue of an infected udder for a considerable time, maybe even a matter of months, before the development of clinical signs in the udder.

In the Milk (Special Designation) Orders provision is made for pasteurisation of milk. The question of pasteurisation has been, for long, a subject for debate. There are those who whole-heartedly support it and would be happy to see its more general use, or even to see all " ordinary " milk pasteurised before sale to the consumer. They are faced with many practical difficulties which the opposite side raise with regard to the widespread application of pasteurisation; yet those who oppose its use have equal difficulty in refuting the statement that *efficient* pasteurisation is the only immediate means of rendering milk which has become infected no longer dangerous. Whatever may be done about pasteurisation, it must be looked upon as a temporary expedient as far as tuberculosis is concerned, for eradication of tuberculosis from bovines will go a long way to answer the long argument about pasteurisation.

It would seem, then, that the best method of ensuring that the milk is free from infection with tuberculosis is to produce it from cows which are free from the disease; this was the basis upon which the Milk (Special Designations) Orders were founded, and these Orders have done a tremendous amount of good work by providing an assurance that those who wanted tubercle-free milk could have it by purchasing Certified or Grade "A" (T.T.) milk. In Scotland, in 1933, the Department of Health[12] reported that in 714 samples of Certified and Grade "A" (T.T.) milk examined by biological test for tuberculosis, only one sample contained the organisms. Until recently, however, there had not been a large increase in the number of such herds, but in Scotland with the incentive offered under the School Milk Scheme (made under Section 11 of the Milk Act, 1934), a big number of owners of free herds not previously licensed have taken out licences to produce tubercle-free milk.

Now, under Section 9 of the Milk Act, 1934, the Tuberculosis (Attested Herds) Schemes have been introduced. These schemes provide a method of official certification that a herd is free from tuberculosis. The schemes embrace all herds which are registered under a Milk Marketing Scheme in force in England and Wales or in Scotland. It is quite competent for a herd producing only a small quantity of milk for use by the household, the farm workers, etc., to register; and here, then, we have the first provision for certification of freedom from tuberculosis of herds which are not essentially milk-producing herds.

The schemes provide for the tuberculin testing (free of charge) of herds which at the last two tests performed on them have contained no reactors. When the herd has passed an official test and become " attested," the herd owner is bound to observe certain rules framed in order to reduce the possibilities of tuberculous infection to a minimum. The rules provide for the prevention of infection arising from contact with animals on neighbouring farms directly or indirectly, or arising from swine, etc., on the attested farm; they deal with shows

and sales at which animals from attested herds may be included, and they deal with the movement of bovines on to and off the premises.

The conditions in the rules have been criticised as being unnecessarily strict, but in practice it has been found that such rules are essential to prevent the introduction of infection. In his Presidential Address to the Veterinary Hygiene Section of this Congress in 1931, Mr. A. Gofton dealt with the dangers of introducing non-reacting animals from infected herds to tubercle-free herds; he concluded his remarks on this point by saying: "In order to qualify for a licence for the sale of Certified or Grade "A" (T.T.) milk it should be made a condition of the licence that the herd producing the milk should be self-contained, or should be recruited as far as may be necessary only from clean, self-contained herds. This, I am tempted to think, is a development which will become inevitable in the future." The rules contained in the Attested Herds Schemes do not appreciably depart from the principles outlined in Mr. Gofton's remarks. The rules have also an important bearing (though an incidental one) on abortion; and mastitis can be controlled within the herd itself if it is self-contained.

It is clear that tuberculosis is the most important disease connected with the milk supply, and there is now adequate opportunity for herd owners to eradicate the disease; mastitis, contagious bovine abortion and non-specific diseases of cattle are definitely important but to a lesser degree. Infections which reach the milk from human sources are also of prime importance, and for this medico-sanitary problem there is ample provision in the legislation.

References

[1]McAllan, J., and Howie, G., *Veterinary Record*, 1931, Volume xi.

[2]Ditto.

[3]Linton, R. G., "Veterinary Hygiene," page 447.

[4]Seeleman, M., "Die Streptokokkeninfectionen des Euters," quoted by R. G. Linton, "Veterinary Hygiene," page 447.

[5]Minett and Stableforth, quoted by R. G. Linton, "Veterinary Hygiene," page 448.

[6]Beattie, C. P., *Lancet*, May 7th, 1932.

[7]Smith, J., *Journal of Hygiene*, Cambridge, Volume xxxii, pages 354-366.

[8]Barratt, M. M., *Journal of Comparative Pathology and Therapeutics*, Volume xlviii, March, 1935, pages 43-50.

[9]Committee on Bovine Abortion Infection in Animals and Man of Agricultural Research Council.

[10]Scottish Committee on Contagious Bovine Abortion.

[11]Report of Cattle Diseases Committee of Economic Advisory Council, May, 1934, paragraph 29.

[12]Report by Department of Health for Scotland on an Investigation of Tuberculosis Infection of Milk, August, 1933.

The Veterinary Record

October 5th, 1935.

SPAHLINGER VACCINE IN NORTHERN IRELAND

We print in this issue an abstract of the report prepared by Lamont, Kerr and Shanks on experiments which have been carried out in Northern Ireland to assess the value of the vaccine prepared by Mr. Spahlinger. The report shows that "the injection of the 'New' simplified dead vaccine prepared by Mr. H. Spahlinger conferred a high degree of resistance against a massive intravenous injection of tubercle bacilli." The authors say further: "It is most unlikely that any similar degree of infection to which the vaccinated animals were subjected would be met with under natural conditions, and it is difficult to resist the conclusion that in this vaccine there exists a means of securing a high degree of immunity to any form of tuberculous infection acquired under natural conditions." If these experiments are confirmed on a large scale, we have in Mr. Spahlinger's vaccine yet another method of conferring an effective immunity against tuberculosis in bovines.

The whole object of the attempts which have been made by many workers and many methods to find an effective vaccine is to protect the human population against the well-recognised danger of tuberculous milk and the farmer from economic loss. One of two methods can be adopted, namely:—

(1) Active immunisation by means of the injection of some form of vaccine;

(2) eradication by removal and segregation of animals which react to the tuberculin test and the building up of tubercle-free herds or areas.

It must be emphasised that these two methods cannot be combined because, as has been shown in the report at hand, and as has previously been found with other vaccines, vaccinated animals generally react to the tuberculin test. It therefore follows that one cannot distinguish by this means between animals which are naturally infected and those which have been vaccinated. The profession has to make up its mind whether one of these methods is to be used to the exclusion of the other or whether the choice is to be decided by conditions on the individual farm. We feel that the profession should encourage eradication

on the basis of tuberculin testing and segregation of reactors as a more permanent solution of the problem.

The claims of this report form a good *a priori* case for further examination of Mr. Spahlinger's vaccine. This should be conducted on lines somewhat similar to the recent work carried out on B C G in this country. Buxton and Griffith (1931), Griffith, Buxton and Glover (1931) and the same authors (1935) found that the degree of immunity depended largely on the size of the dose and method of administration. Double intravenous inoculation of B C G in adequate doses conferred a high degree of resistance against virulent bovine culture by the same route, and complete immunity to the oral administration of virulent bovine cultures which produced moderately severe local and slight generalised tuberculosis in unprotected animals of the same age. Further, that this complete immunity lasts a variable time, which under the conditions of this experiment ranged from nearly six months to more than a year. These findings suggest that a relative immunity lasts for a much longer period. They also showed that revaccination restored the immunity but that the protection was complete in a smaller proportion of calves than after primary vaccination.

Yet another method which has been reported upon favourably within recent years is the so-called "Diaplyte" vaccine of Dreyer. In a field experiment extending over nine years in a herd of which 90 per cent. were originally infected and in which no other measures than regular vaccination were used, it was found possible to produce and maintain a high degree of immunity. The proportion of tuberculin-positive animals was greatly reduced.

It should be noted that in the Northern Ireland experiments the calves were four- to five-months-old when the when the experiment started and had been reared under conditions which excluded tuberculous infection. Any vaccine to be of value must be used within the first few days of life and confer a serviceable immunity for at least a year.

We feel no doubt that Mr. Spahlinger's vaccine confers a high degree of resistance. Considerable further work remains to be done before it can be accepted as a practical method of vaccination. It should be further tested in order to ascertain the duration of its immunity under intensive forms of natural infection (most dead vaccines have, so far, given a relatively brief immunity), the necessary dose and to see whether the calves can be protected from birth.

References

Buxton, J. B., Griffith, A. S. 1931. *Lancet.* February 21st. p. 393.

Griffith, A. S., Buxton, J. B., and Glover, R. E. 2nd Rep. University of Cambridge Institute of Animal Path. p. 46.

———. *Lancet.* 1935. February 23rd. p. 451.

Dreyer, G., Vollum, R. L., and Ammitzböll, H. H. 1934. *J. Comp. Path. and Therap.* 47. 1.

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INFLUENZA

THE group of diseases to which this term is commonly applied was considered earlier in the year by the Comparative Section of the Royal Society of Medicine. Dr. C. H. Andrewes led the discussion on behalf of the medical workers and Dr. J. T. Edwards gave a review (printed elsewhere in this issue) with regard to the conditions in animals, devoting particular attention to those affecting the horse.

The important recent progress on the subject is emphasised by the nature of the references given by Dr. Andrewes to his paper, the earliest being a 1931 publication. Our readers are now familiar with the interesting and important work commencing with Shope's demonstration of a virus associated with a bacillus as the cause of swine influenza in the United States, followed by the isolation, by the brilliant team at the National Institute for Medical Research at Hampstead, of a virus from human influenza patients.

The demonstration that these two viruses are almost identical is striking proof of the aptitude of the terms used to connote the respective diseases. It is significant that the success attained by the Hampstead workers has been due largely to the possession of a relatively new "reagent" for virus work—the ferret for use as a test subject—this again depending upon a recent development, its use in the dog distemper investigation.

Dr. Edwards' excellent review is noteworthy for several reasons. In the first place, it brings to the notice of veterinary readers information concerning available clinical knowledge that has apparently been overlooked because of the circumstances in which it was published. Further, it illustrates, on the one hand, the frustration that is so frequently the lot of the scientist and, on the other hand, the devotion with which he takes advantage of every possible means to develop the theme that has captured his interest—even down to a last effort when on his death bed. It is, moreover,

an example of the value of sound and closely reasoned clinical observation coupled with competent experimental methods, each being complementary to the other. In view of the enormous financial and other loss that has resulted from pink-eye and equine contagious pneumonia it is remarkable that they were not properly dealt with even in the days prior to the War.

This work emphasises the difficulty in getting world-wide recognition of important scientific progress. There are many noteworthy examples, an outstanding one being the discovery in 1900 that, 35 years previously, Mendel had made an epoch-making discovery concerning the natural laws governing heredity. When the work was completed, the records were not made available to those capable of appraising the importance and of developing the principles that Mendel had discovered. In the case of the German work referred to by Dr. Edwards, the results were published in a journal that is not widely read in the English-speaking countries, with the consequence that, although important, it was almost unknown.

In the circumstances, there is great value in reproducing from time to time in *The Veterinary Record* important articles that its readers might not otherwise have an opportunity to study. It is hoped that Dr. Edwards' review will be read with interest by practitioners and by many others in the veterinary profession.

Annotation

SURRA: THE DISCOVERY OF *TRYPANOSOMA EVANSI* AS THE CAUSE

The Recorded Official Attitude Towards Dr. Griffith Evans's Original Announcement—an Example of Official Ineptitude

The life-history of our distinguished and venerable centenarian published in *The Veterinary Record* of August 3rd gave in relief the circumstances in which he made his great scientific discovery, which was the identification of the causal parasite of surra—the first discovery of a pathogenic trypanosome. The discovery, it was stressed, was not a fortuitous one, but the outcome of deliberately planned research undertaken by a worker who had equipped himself with knowledge, then in a primitive state, for his task, which had to be carried out in the face of much difficulty.

Among veterinary and other scientific workers in India who have lived in the tradition of the above discovery, the reception given by the Government of the Punjab of the time to the announcement of Evans's original discovery is often recalled as a classic instance of what sometimes seems to be the curious inversion of the official mind when it passes judgment on scientific matters. As the late R. Eustace Montgomery wrote several years ago, "one almost reads a note of censure in the remarks made by the Lieut.-Governor of the Punjab on Evans's report, 'that whilst recognising the importance of the discovery, he regretted that no cure had been found for the disorder'." (*Journal of Tropical Veterinary Science.* 1908. 3. 301.)

A copy of Dr. Griffith Evans's original report on surra has been traced and seen at the British Museum, not, however, as an individual document, but as a full reprint of the original added on to another report on surra in Burma by J. H. Steel. The full title of the latter is:—

"Report of Veterinary Surgeon J. H. Steel, A.V.D., on his Investigations into an Obscure and Fatal Disease among Transport Mules in British Burma, which he found to be a Fever of Relapsing Type, and probably Identical with the Disorder first described by Dr. Griffith Evans under the Name "Surra," in a Report (herewith reprinted) published by the Punjab Government, Military Dept., No. 439-4467, of December 3rd, 1880, *vide The Veterinary Journal* (Index) 1881-82." [pp. 89.]

The full title of Evans's report is:—

"Military Department, December, 1880, No. 7, Report on Surra Disease, from G. Evans, Esq., M.D., Inspecting Veterinary Surgeon, British Army, on Special Duty, to the Assistant Adjutant-General, Punjab Frontier Force, dated Simla, November 13th, 1880, No. 27B." [30 pp. fcp.]

At the end of it appears the official covering notation, which is as follows:—

"From Colonel S. Black, Secretary to Government, Punjab, Military Department, to the Secretary to the Government of India, Military Department, dated Lahore, December 3rd, 1880, No. 439-6667.

"I am desired to forward, for the information of the Government of India, a copy of a report by Veterinary Surgeon G. Evans, M.D., of his investigation into the nature and origin of the disease named *surra*, which has recently been so fatally destructive among the horses of the 4th Punjab Cavalry, and which appears to be locally prevalent on the Dera Ismail Khan border.

"(2) His Honour will not at present offer any remarks on this interesting report, but he extremely regrets to observe that no cure for *surra* has been discovered."

PROFESSOR J. J. O'CONNOR, M.R.C.V.S.
Principal, Veterinary College of Ireland

APPOINTMENT OF PROF. J. J. O'CONNOR, M.R.C.V.S. AS PRINCIPAL OF THE VETERINARY COLLEGE OF IRELAND, DUBLIN

We would join his many friends and former students in offering our hearty congratulations to Professor J. J. O'Connor, M.R.C.V.S., on his appointment as Principal of the Veterinary College of Ireland in succession to Professor J. F. Craig, as announced in our issue of last week.

Professor O'Connor is a Dublin man and was born and brought up on a large livestock farm in Co. Dublin, on which he spent three years after having received his general education. He was educated at Castleknock and Clongowes Colleges, Dublin, and passed the Matriculation and First Examination in Arts of the Royal University of Ireland. His professional training was taken at the Royal (Dick) Veterinary College, where he gained distinction in several subjects and qualified in 1899. Afterwards he was appointed to the post of Hospital Surgeon and Lecturer in Stable Management and Shoeing at the Edinburgh College and received from Professor Dewar, at the termination of his appointment, an inscribed silver presentation "As a Mark of Respect and Appreciation of Faithful Services." He also delivered lectures for the Edinburgh School of Rural Economy.

During the South African War he was employed by the War Office and made several voyages to South Africa from England and the Continent in charge of remounts. In 1902 he was appointed as Professor of Surgery at the Veterinary College of Ireland, and this position he still retains.

In veterinary surgery Professor O'Connor has gained for himself a well-earned reputation as a highly-skilled and successful operator and an excellent teacher of the subject. His contributions in surgery to the veterinary periodicals and before veterinary societies are well known, while he has written various surgical articles for Wooldridge's "Veterinary Encyclopædia" and the article on "Peritonitis" in Wallis Hoare's "Veterinary Medicine." He is best known, however, as the editor of the new edition of Dollar's "Surgery," which he thoroughly revised and extended and which is now regarded as a standard veterinary text-book.

Professor O'Connor has been President of the Veterinary Medical Association of Ireland on two occasions and has done yeoman service for the veterinary profession in Ireland as Hon. Secretary of that society for over twenty years. He acted as Local Secretary of the N.V.M.A. when the Annual Congress was held in Dublin in 1926 and has been a Vice-President on more than one occasion. Since its inception he has also been President of the Irish Free State Veterinary Council.

With his experience and reputation we anticipate for him continued success in his new position and extend to him our best wishes for the future of the College over which he now presides.

STAFF PRESENTATION TO PROFESSOR CRAIG

At the Veterinary College of Ireland, Dublin, on Thursday, September 26th, Professor J. F. Craig, M.A., M.R.C.V.S., was presented by the staff of the College with a handsome pair of water colour paintings of Connemara landscape, on the occasion of his departure to take up duty in Liverpool University as Professor of the William Prescott Chair of the Care of Animals, Causation and Prevention of Disease.

Professor O'Connor, who made the presentation on behalf of the staff, said that they all keenly regretted the departure of Professor Craig with whom they had all worked in cordial association for so many years. They wished him good luck and success in his new sphere of activities.

Professor Craig thanked the staff for their presentation and for their kindly thoughts and good wishes. Their harmonious relations and co-operation in the work of the College was a source of great gratification and a very pleasant memory to him, and for that reason and on account of the many friendships he had made in the country he was very sorry that his intimate association with them was to be severed.

Particulars were also obtained of the reference in *The Veterinary Journal*. Although differently titled it is exactly the same in text as the self-contained report, but without the official covering notation. The full reference is:—

Evans, G. (1881-1882). "On a Horse Disease in India known as 'Surra' probably due to a Hæmatozoon." *Vet. J.*, **13**, 1-10, 82-88, 180-200, 326-333, and **14**, 96-110 and 181-187.

J. T. E.

"The meat trade is being ruined by the small house, the small car, the small family and the small oven," said Mr. Tom Hill, vice-president of the National Meat Federation at Lincoln. Grading and marking of beef was doomed to failure before it started, he added, because it could only be carried on by the adoption of a centralised system of slaughtering.

Abstracts

[**I.—Early Abortion in Cattle.** Küst. (1934.) *Deuts. tierärztl. Wschr.* **42.** 28. pp. 439-444.

II.—The Importance of Trichomonads in Causing Sterility and Early Abortion in Cattle. Witte. (1934.) *Deuts. tierärztl. Wschr.* **42.** 28. p. 444.

III.—The Control of Trichomonad Infection. Abelein. (1934.) *Deuts. tierärztl. Wschr.* **42.** 29. pp. 449-453.]

I.—Küst mentions some of the more uncommon causes of abortion in cattle, including dietetic errors such as the improper use of acid silage, and records an outbreak of abortion caused by feeding earth-nut cake grossly contaminated with mustard. During the last ten years epidemics of sterility and early abortion have been reported from many districts of middle and south Germany, and blood tests showed that the trouble was not connected with the presence of *Br. abortus* infection. The general history showed that two to three days after service infected females showed swelling of the vulva and a suppurating discharge. The animals became restless and evinced slight systemic disturbance. These symptoms usually abated after a few days, but the discharge reappeared after an interval of eight to twelve weeks, and in many cases abortion supervened. In some cases Küst noted little vesicles in the genital passages similar to those described by Reisinger, and Witte has recently established an etiological relationship between these vesicles and early abortion.

The demonstration of trichomonads in the uterine secretion of such cows, and the presence of this parasite in the various organs of the aborted fœtuses serves to illustrate the importance of this type of abortion. After observations extending over hundreds of cases, the author gives the following account of the course of trichomonad disease in cattle.

Infection is transmitted by copulation, and the first symptoms, consisting of swelling and congestion of the vulva, restlessness and vaginal discharge, may occur within a few hours of service. After the third day trichomonads may be demonstrated in the discharge. If conception does not occur, chronic endometritis results and there is recurring œstrum. When pregnancy ensues after infection the fœtus dies, but as œstrum ceases the animal is considered to be pregnant, although the uterus merely fills up with fluid. Abortion may now occur and generally happens six to 16 weeks after conception. Trichomonads are numerous in the organs of the fœtus and in the membranes and fluids of the uterus. The disease is generally introduced by the purchase of an infected cow, and is soon spread, *via* the bull, to the other members of the herd, exerting a crippling effect on the breeding health. In the bull the penis is inflamed, red and swollen, rendering urination painful and the animal becomes unwilling to serve. The prepuce is swollen and trichomonads may be demonstrated in the preputial secretion. On the mucous membrane little pin-head-sized vesicles, similar to those seen in the cow, may be detected. The acute symptoms abate after a few days and the bull apparently returns to normal. That this is the usual method of transmission is shown by the fact that all animals served by one bull become affected, while other cows served by another bull on the same premises have been noted to remain normal. Direct infection is also possible without coition as trichomonads may remain alive in the urine.

Recognition of trichomonad infection is usually fairly easy. The coarse, eroded nature of the mucous membrane of the vagina, the accumulation of slimy secretion in the vagina and the open cervix are characteristic, but since these can result from other causes confirmation of the diagnosis may be sought by microscopical examination. Air-dried smears should be stained with carbol-fuchsin for two to three minutes. The disease is most common on small premises, where the buildings and general herd hygiene are inferior, and this has led the author to think that these conditions favour the spread of trichomonad infection.

In order to combat the disease the following steps should be taken: (1) Veterinary examination of the genital organs of all breeding animals, including bulls. (2) For a period of six to eight weeks the service of cows should be suspended entirely. (3) All affected and suspicious animals should be treated, and carefully watched for the reappearance of symptoms. The author has obtained good results from lavage with physiological salt solution, followed by irrigation with 1 : 1,000 chinosol solution, which kills the trichomonads and is non-irritant. Treatment should be repeated at four- or five-day intervals. (4) Infected animals should be placed together at the end of the cowhouse and next the drain, so that infected urine may be conveyed from the building.

II.—The author infected three cows during œstrus with a pure culture of trichomonads to test their effect upon conception and pregnancy. Thereafter these cows were repeatedly served by the same bull, which was shown to have acquired the infection. The trichomonads set up an acute catarrhal vaginitis and the three cows failed to conceive despite repeated services. This sterility was attributed to the colonisation of the trichomonads in the vagina. In support of the view that this parasite may also cause actual abortion, the author records that on twelve occasions he has demonstrated trichomonads in fœtuses, aborted mostly after

about one month's gestation. The complement fixation test has been used in diagnosis, and specific results are claimed using cattle serum and an antigen composed of trichomonads.

III.—Diagnosis of trichomonad infection presents certain difficulties which a microscopical examination does not altogether remove. Pyometra after service and early abortion are, however, always suspicious, and fœtus, membranes and the various secretions should be examined for trichomonads. These are found with greatest certainty in the discharges which leave the uterus at parturition, since the primary situation of this parasite is between the wall of the uterus and the placenta. The author lays down the principles of preventive treatment, which aims at eradication, and stress is laid upon diagnosis, closing the herd and suspending breeding operations until recovery takes place. Irrigation with Lugol's iodine solution has given good results.

W. L. S.

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[The Control of *Br. abortus* Infection by Elimination of Bacteria-expelling Animals. VAN OYEN, C. F. (1934.) *Deuts. tierärztl. Wschr.* **42.** 29. pp. 457-460.]

Healthy animals become infected with *Br. abortus* through contact with infected bacilli-expelling cases, and the author has found that the elimination of cows which expel *Br. abortus* in their milk is speedily followed by the extinction of the infection, even in severely infected premises. The most convenient method of detecting dangerous animals is by milkserum agglutination tests supported by blood tests. This divides the animals into three groups, *viz.*, bloodserum and milkserum positive, bloodserum and milkserum negative and, lastly, bloodserum positive and milkserum negative. This last group should be separated from the healthy cattle. The author obtained the organism from the milk in seven cases where the blood agglutination titre was only 1 : 50, contrary to reports from the United States, where udder infection was rarely seen in cows with a blood titre below 1 : 100. On this basis the author has worked out simple control measures which are effective in practice.

W. L. S.

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[Comparison of the Rapid and Slow Agglutination Tests of Whey for Contagious Abortion. RIEDMÜLLER, L. (1934.) *Schweiz. Arch. Tierhlk.* **76.** 6. 279-286.]

The rapid test described by the author is carried out on a glass slab lying on top of a shiny black surface. One or two drops of milk are placed on this plate and mixed with an equivalent amount of antigen. [The density of the antigen is not recorded but, from the context, it would appear to be a very thick suspension of Brucella.] Tests with samples of milk known to give positive and negative reactions to the test are put up at the same time as controls. The appearance of positive and negative reactions is described. The slow agglutination test presents no features of unusual interest.

Out of 424 samples compared by these two tests, 374 gave negative results to both, 14 were negative to the rapid method but agglutinated to titres between 1 : 5 and 1 : 20 by the slow method, and eight gave positive reactions to the rapid method whilst agglutinating to titres between 1 : 10 and 1 : 20 by the slow method. The remaining 28 samples gave obviously positive reactions to both tests. In no case did the rapid test give a positive result which was not confirmed by the slow test.

Whole milk can be used for the rapid test, which saves time and results are available within a few minutes of mixing the reagents.

E. J. P.

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[The Problem of Caprine Brucella Infections in the United States. MEYER, K. F., and EDDIE, B. (1935.) *J. Amer. Vet. Med. Ass.* **86.** 3. pp. 286-302. 1 table. 66 refs.]

Although cases of undulant fever occurring in the southern states and apparently associated with *Br. melitensis* from goats have been reported on many earlier occasions, no caprine Brucella strains of American origin had been fully investigated by laboratories engaged in comparative study up to 1930. Since this date 2,500 goats have been examined by the rapid agglutination method and the data indicate that approximately 1 to 4·8 per cent. may be infected with *Br. melitensis*. Nine separate cultures were isolated and subjected to bacteriological analysis. The findings show conclusively that the disease in goats of the south-west of the United States is due to typical caprine *Br. melitensis*. Milk whey agglutination reactions above 1 : 320 indicated udder infection. Herd records showed 10 to 20 per cent. of abortions, but conclusive proof of their cause could not be obtained. Oral, conjunctival or subcutaneous infection with caprine *melitensis*, on the other hand, caused abortion in four out of seven goats, 17 to 30 days after administration, whilst one was killed and showed a typical chorion placentitis and purulent endometritis, and two had dead fœtuses at full time, again with placentitis. Cows infected with goat strains have also proved highly dangerous as a source of human infection, while sheep (which are commonly involved in France) have not yet been proved dangerous in the United States.

Latent infection in naturally or experimentally infected animals is common and many animals remain infected for life, but recovery certainly occurs and appears due to pronounced

phagocytic activity and a marked general and local allergy. Injection of moderate doses of porcine and bovine strains in goats is followed by complete recovery.

Agglutination and complement-fixation tests of sera and whey, blood cultures and vaccination are discussed. "Public health authorities should demand that goat milk dairies consist of animals which give negative skin, blood and whey tests." Vaccination cannot be recommended at present.

Susceptibility of the host seems more important than virulence of the germ in producing clinical human disease.

C. V. W.

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[**Organic Lesions in Swine caused by** *Brucella suis*. Creech, G. T. (1935.) *J. Amer. Vet. Med. Ass.* **86.** 2. 211-216.]

The author records a case of *Br. suis* infection in a pig where the lesions involved the kidney, liver and hepatic gland. The macroscopic changes in these organs were quite similar in appearance and may be described as consisting of encapsulated nodules, varying in size, which on gross section showed a homogeneous necrotic appearance of a slightly yellowish or creamy colour. In the liver the lesions involved the entire hepatic gland, which was much enlarged, and the adjacent liver tissue. In the kidney the lesions were confined to the medullary portion of the organ. Histological examination showed the lesions to consist of amorphous central masses with a distinct line of demarcation between the necrotic centres and the adjacent tissue. Surrounding the degenerated areas, just beneath the capsule, were zones of cellular infiltration consisting of small, round or connective tissue cells and leucocytes, many of the latter being eosinophile cells.

S. J. E.

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[**Effects of Certain Environmental Influences on the Longevity of** *Brucella abortus suis*. Feldman, W. H., and Olson, O., Jr. (1935.) *J. Amer. Vet. Med. Ass.* **86.** 2. 153.]

This article deals with the ability of a porcine strain of *Br. abortus* to retain its viability outside the animal body. The results of the experiments may be summarised as follows:—

(1) The organism in broth culture was viable and pathogenic at room temperature after 30 days but not after 152 days; at a mean temperature of 41°F. the organism was still viable at the maximum period.

(2) After storage for 400 days at −20°F. broth cultures were still pathogenic for guinea-pigs.

(3) When the organism was deposited in a fine spray on four different kinds of soil kept outside exposed to the sun, it apparently died in four days.

S. J. E.

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[**I.—Bovine Hæmoglobinuria associated with an Intestinal Infection caused by the** *Cl. welchii*. Schofield, W. (1933.) *Report of the Ontario Veterinary College*. 42-61.

II.—Discussion on Hæmoglobinuria. Minett *et al. Proc. Roy. Soc. Med.* April, 1935.]

I.—Bovine hæmoglobinuria has for many years been associated with certain types of pasturage, more especially the rough moorland variety and similar damp, heavy, poorly-drained land. Investigating the disease in Ontario, the author found that the relationship lay rather with the type of feeding, more particularly when the ration included such bulky, succulent things as kale, rape and turnips.

On examining the fæces at various stages of illness an organism, identical with *Cl. welchii*, was discovered in very large numbers, and in experimental cases the numbers of this organism, which appears to be a normal inhabitant of the intestine, fluctuated as turnips were added or removed from the ration. Although the number of experiments carried out does not permit of a final conclusion, there seems sufficient evidence to indicate that this organism is of some significance and that the chemical and physical nature of the ration plays a part in the causation of the disease.

The clinical aspect, epidemiology and *post-mortem* lesions are described and discussed. The disease is commonest in the cold months when animals are most frequently stall fed and recently-calved cows seem to be particularly susceptible.

II.—In considering this class of diseases Professor Barcroft pointed out that it is of primary importance to have regard to the physiology of the kidney and the nature of hæmoglobin. The action of Bowman's capsule, it is now agreed, is purely one of mechanical filtration. Reference to recent work suggests that there is more than one kind of hæmoglobin differing in molecular size, a fact having a bearing on filtration.

Dr. Minett grouped the diseases under the headings of Hæmoglobinurias and Myoglobinurias. From the literature it would appear that, apart from the well-established parasitic forms, bacteria and chemical agents were capable of producing symptoms of "red-water." Liver necrosis appeared to be a fairly common lesion in all types, probably due, at least in part, to embolism from red cell stroma.

In myoglobinurias myoglobin takes the place of hæmoglobin. In such cases the plasma is not coloured. Myoglobin is freely excreted in the urine, however.

With regard to the etiology of paralytic

myoglobinuria of horses, it appears that, on commencing work, a horse that has been rested for two to three days produces more lactic acid than one that has been worked regularly on account of the considerable storage of glycogen in the muscles which occurs during rest on full diet, and particularly if the animal has been fed on a diet rich in carbohydrates (sugar-beet pulp). The combined circumstances produce a great excess of lactic acid, which in turn causes a circulatory impediment resulting in the well-known chain of symptoms.

An enzoötic myoglobinuria of horses is to be distinguished from the above, but the latter appears to be produced by a dietetic deficiency.

N. S. B.

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[**A Differential Character of** *Clostridium welchii* **Type D.** Bosworth, T. J., and Glover, R. E. (1935.) *Proc. R. Soc. Med.* **28.** 8. 1004-1006. (3 refs.)]

The classification of strains of *Cl. welchii* into four types as suggested by Wilsdon (1931) is referred to, *viz.*, Type A, represented by the classical type of *Cl. welchii* associated with gas gangrene, Type B (lamb dysentery bacillus), Type C associated with entero-toxæmia in sheep and Type D, also associated with entero-toxæmia in adult sheep, but probably of greater importance in this country as the causal agent of entero-toxæmia in lambs (pulpy-kidney disease). The toxins of these four types are distinguishable by toxin-antitoxin reactions and to some extent by their physical and pathological characters. Thus, the toxin of the D type is characterised by the facts that it resists a considerable degree of heat and is not neutralised by the antitoxins of the other three types. It is therefore assumed that the D type of toxin contains a component which is absent from Types A, B and C.

The authors found that when D toxin was added to filtered intestinal contents from normal sheep the potency of the toxin was enhanced 30 to 40 times. The filtrate had no effect upon the toxins of the other types. It was further established that this reaction was associated with the heat-resistant element of the D toxin. The activating factor in the filtrate was present throughout the small intestine and in all samples examined from 17 sheep. It was also present in the filtrate of intestinal contents from rabbits and guinea-pigs.

The amount of antitoxin necessary to neutralise a given amount of toxin was not, however, affected by the addition of the filtrate. When, therefore, toxin of the D type is detected in the intestinal contents in suspected cases of entero-toxæmia, the amount of toxin can only be arrived at by determining the amount of a D antitoxin serum of known titre required to neutralise the toxin.

R. S. R.

Report

SPAHLINGER EXPERIMENTS IN NORTHERN IRELAND*

It will be remembered that in 1930 certain experiments were carried out in Norfolk in which it was shown that a vaccine prepared by Mr. H. Spahlinger conferred a high degree of resistance against artificial infection with *M. tuberculosis*. Briefly, 17 out of 18 vaccinated calves were still in thriving condition 21 months after the injection of a dose which killed four out of five controls within 60 days.

In view of this result it was decided that a further test of the vaccine should be carried out in Northern Ireland by the Veterinary Research Division of the Ministry of Agriculture, an interim report of which was published in *The Veterinary Record*, 1932, December 17th.

The present report, prepared by Lamont, Kerr and Shanks, consists of a non-technical report, a technical report, and appendices giving details of the clinical and *post-mortem* findings, results of inoculation of suspect material into guinea-pigs, tuberculin tests, calves born during the experiment from heifers which were mated, together with two addenda, one giving the dose of vaccine received by each calf and the other brief details of the method of preparing the vaccines.

Thirty-two calves were used for the experiment. All were from tuberculin-tested herds and were reared out-of-doors and fed on Grade "A" (T.T.) milk. They were four to five months of age at the time of vaccination. Group I, six calves, received 0·1 to 1·0 c.c. of "Old" vaccine; Group II, two calves, received 1 and 2 c.c. respectively of vaccine from a strain which had been grown on "specific" media (*i.e.*, the serum or blood of cattle), then on potato for five or six years and again on "specific" media for four years. Group III, eleven calves, received 0·2 to 0·6 c.c. of "New" vaccine prepared in 1929. This was the group of major importance and was subdivided into four subgroups of which one was vaccinated intravenously (Subgroup IIIa), one subcutaneously (IIIb), one intramuscularly (IIIc), whilst in Subgroup IIId the vaccine was given subcutaneously suspended in olive oil. Group IV, two calves, were given 5 and 20 c.c. respectively of a filtered extract of tuberculous lesions. Group V, two calves, were given 8 and 20 c.c. respectively of "specific" culture medium on which *M. tuberculosis* had been grown. Group VI was the control group and consisted of nine calves which were not vaccinated. Two of these were used

* Report on Spahlinger Experiments in Northern Ireland 1931-1934 (1935) Belfast: H.M. Stationery Office. (Report by Lamont, H. G., Kerr, W. P., and Shanks, P. L.)

in preliminary tests made in order to arrive at a suitable test dose (*i.e.*, as suggested by Mr. Spahlinger), one which, when given intravenously, would kill unvaccinated animals in one to two months.

Six months after the vaccinations were carried out each calf was injected intravenously with 2·5 milligrammes (0·0025 gm.) of dry growth of *M. tuberculosis* of bovine origin from actively growing cultures on slopes of Petroff egg medium, growths from seven different strains being mixed. Care was taken that each animal received the whole of the prescribed dose.

Of the seven controls (two were used in the preliminary virulence tests) five died from generalised tuberculosis in an average time of 43 days, whilst two passed through an acute febrile attack lasting about 30 days, and when killed over two years later showed tuberculous lesions of a non-progressive nature. Of the two animals of Group IV which, as stated, had extract of tuberculous lesions, and were not expected to survive, but were looked upon as further controls, one died in 34 days with generalised tuberculosis, the other passed through an acute febrile phase and became chronically affected. It was killed two years later and showed *post-mortem* generalised and progressive tuberculosis.

The eleven animals of Group III which received the "New" vaccine all "resisted the injection in a similar manner." All experienced an acute febrile attack shortly after the test injection, attended by some loss of condition and coughing, but were apparently normal within seven to at most 21 days. One animal developed tuberculous meningitis about 500 days after injection of the test dose and died from a hypostatic pneumonia after 607 days. The remaining ten animals were killed two to two-and-a-half years later, all being then in good condition. One had a tuberculous udder and fairly widely disseminated lesions. This animal had suffered from an attack of streptococcus mastitis some months earlier and, it is suggested, this may have had a bearing on the result. The other nine all showed tuberculous lesions of a non-progressive nature but were considered by the Belfast City Veterinary Officer as fit for human consumption.

The authors of the report note that calcification was not a marked feature of the nodules found in the vaccinated animals, whereas in the two surviving controls calcification was very evident. Most of the lung nodules in the vaccinated animals had a well-developed fibrous capsule and contained yellowish, oily pus of the consistency of whipped cream or material which shelled out like peas. Suspensions from the lesions in the vaccinated animals produced generalised tuberculosis in guinea-pigs in all cases, one or two being also microscopically positive. Suspensions from glands in which no visible evidence of disease was seen were negative.

Of the six animals in Group I which received "Old" vaccine, three proved highly resistant and were slaughtered over two years later, whilst one also showed definite resistance but died two years later, and two showed no resistance. Of the two animals in Group II, one survived and one died in 45 days. All of the three animals in Groups I and II which showed no resistance were tuberculin tested in error four months before the test dose was given. The two animals in Group V which received medium on which tubercle bacilli had been grown both showed marked resistance and were in fair or good condition when slaughtered two to two-and-a-half years later. These were also tuberculin tested.

No tuberculin tests were carried out in Group III between the time of vaccination and injection of the test dose, but those carried out in other groups were in most cases positive.

The details of the preparation of the vaccine are brief and lack precision. The strain used is of bovine origin and is not passed through animals of any other species, *e.g.*, the guinea-pig. It is cultivated only on media composed of bovine blood, serum, organ or tissue extract collected in a sterile manner and heated only when necessary to produce solid media. When the growth is obtained the organisms are "emulsified in a sterile manner in the absence of oxygen" [no details of this procedure are given] and stood in a cool, dark place until the organisms have died a "natural death"—a year or longer. It is stated that traces of antiseptics, *e.g.*, formaldehyde, may be added to the emulsion before sealing in the ampoules.

The authors conclude that the "New" simplified dead vaccine conferred a high degree of resistance against a massive intravenous injection of tubercle bacilli, and that in this experiment the intramuscular method of vaccination gave the most satisfactory results.

It is to be noted that during the course of the experiment all the vaccinated animals were also subject to intense natural infection through the presence amongst them of animals suffering from tuberculosis [presumably the controls]. Four of these animals passed through the strain of pregnancy and lactation.

LONDON DAIRY SHOW

It is announced by the British Dairy Farmers' Association that the entries received for the 57th Annual Dairy Show to be held at the Royal Agricultural Hall, Islington, on October 22nd to 25th, total 2,133, compared with 2,153 last year. Cattle entries number 417. Ten entries were received in a new class for sterilising equipment consisting of boiler and chest for the steam sterilisation of milk utensils on the farm.

N.V.M.A. Divisional Report

MIDLAND COUNTIES VETERINARY MEDICAL ASSOCIATION*

MEETING AT HEREFORD

President's Inaugural Address

The quarterly meeting of the Midland Counties Veterinary Medical Association was held at the Green Dragon Hotel, Hereford, on Friday, May 31st, 1935. The President, Mr. J. R. Barker, occupied the chair, and among those present were Messrs. H. W. Steele Bodger, D. Forwell, L. C. Tipper, G. F. Banham, T. Marriott, H. W. Griffiths, J. A. McLauchlan, J. L. Brain, J. S. Bowden, W. F. McConnell, J. M. Pratt, W. F. Wilson, R. S. Wilson, J. P. McKinnon, H. W. Brooke, W. L. Dwerryhouse, J. W. Conchie, W. F. Aston, J. H. M. Hughes, T. P. Yarrow, F. C. Davidson, F. L. Clunes, J. V. S. Rutter, A. Thomson, W. R. Downham, T. H. Hobson, H. Thornton, C. K. Lomas, A. A. Forsyth and the Hon. Secretary (Mr. H. W. Dawes).

The company were first entertained to luncheon by the President, and at the conclusion of an excellent repast his health was proposed in felicitous terms by Mr. H. W. Brooke.

Their President, said Mr. Brooke, was one of the most active members the Association had. He was not only regular in his attendance, but contributed freely to the discussions. He had always something interesting, and often original, to say, and no one was more worthy of the position he now occupied.

The President, in reply, said it was a pleasure to see such a large gathering. He had thought Hereford was too much out of the way, but he was evidently mistaken.

New Members.—At the business meeting which followed, two new members were elected, namely, Mr. J. Caffrey, M.R.C.V.S., D.V.S.M., of the City of Birmingham Veterinary Department, and Mr. G. S. Muir, of Bridgnorth, Salop.

The Hon. Secretary said that, as a happy sequel to the recent visit to Weedon, he had pleasure in nominating Mr. Paul Crosfield, of Chipping Norton, for membership of the Association.

Votes of Condolence.—The Hon Secretary announced that since the last meeting two members of the Association had passed away—Mr. Mark Tailby, of Birmingham, and Mr. George Bolton, of Sandbach. Both were very old members of the Association, and although in recent years they had not attended meetings, they had maintained their interest to the end. Mr. Tailby was a doyen of the profession. He was the second oldest veterinary surgeon on the register, and he had died at the age of 97. The Hon. Secretary added that he was pleased to report that the Association was well represented at the funeral. Mr. Bolton was another old and valued member and he had always evinced the greatest interest in the affairs of the Association.

Mr. Brooke said he could not allow the opportunity to pass without saying a word about Mr. Tailby. That gentleman, throughout his long life, did much to uphold the dignity of the veterinary profession, and he was always a man to whom the young practitioner could turn for counsel and advice.

The Hon. Secretary was instructed to send a letter of sympathy to Mr. James Martin, of Wellington, Salop, who had been ill. The members present expressed the hope that he would soon be restored to health and be amongst them again.

Professor Gamgee.—A letter was read from Professor Gamgee, of Birmingham, expressing his appreciation of the compliment which the Association had paid him in electing him an honorary life member. He said he welcomed it all the more "because so many members of his family belonged to the veterinary profession."

President's Address

The President, in an inaugural address, said it was a pleasure to see so many members in attendance at Hereford. The city was quite on the outside edge of the Midlands area, and he was afraid some of them would not have undertaken the journey. Now they would see what a long way it was for members in the Hereford district to attend meetings in Birmingham or even further afield.

"I am conscious," continued the President, "of my shortcomings for this office and of the responsibilities that go with it. I do feel, however, that the veterinary profession and its individual members can look back with pride upon the last 25 years and with confidence to the next 25 years. The period happens to coincide with the Jubilee of the King, and I may mention that it was in 1910 that I came into the profession. A lot of changes have taken place. We can claim that our own science has advanced equally with other sciences. At the same time I think individual members may be a little dissatisfied with their lot. If we look at the educational reforms that have taken place, we must admit that they are bound to bear good fruit—the coming into being of the five years' course and the possibility of taking what one might call the pre-medical studies at Cambridge or Oxford. Nothing has impressed me so much as this question of close working

* Received for publication September 10th, 1935.

between the veterinary profession and the universities, especially the success of veterinary investigation officers located at the universities throughout the country. Those who have served on the committees in London know they will play a big part in clinical investigation in the future. So one welcomes the possibility of closer working with the universities.

"I do not know much about the detail work of the Royal College of Veterinary Surgeons, though some of our members are on the Council, and it behoves us to see that men like Mr. Howard Dawes continue to represent us in that quarter. But during the last few years I have been serving on the Council of the 'National,' which is engaged more on the political than on the professional side of veterinary practice. I have been strongly impressed with the necessity of having general practitioners from the provinces at meetings of the 'National.' You find that many members of the profession who are not in general practice can spare the time to attend meetings of public bodies in London, and I have often thought of the peculiar attitude shown in the advice they give to those bodies. Unless practitioners from the provinces are there to correct these loose statements about what goes on in the provinces I am sure a grave injustice will be done to our side of the profession. It is a peculiar kind of snobbishness that will allow men to give, as members of the profession, advice that hurts some other members of the profession. I think there is great need for co-operation, and those members who serve with me in London will support me in that. The great thing one finds is that during the last few years there has been serious interference by the Government in agriculture, affecting the services which the veterinary profession renders to farmers and others. Agriculturists are expecting free services. One knows, of course, that everything which is supposed to be free has to be paid for by somebody, yet people are waiting in the fond hope that they will get something for nothing. It is peculiar that at the present time the schools should be filled with students. It would appear that parents and sons rather welcome this Government interference, in the belief that there is going to be plenty of work for everyone. I agree to some extent. A lot of work remains undone that should be done by our profession, and if by our attendance in London we can make satisfactory conditions for rendering service to the public, then the profession is certain to go forward to bigger things. That is my belief, but it can only be brought about by co-operation between all the interests concerned. If during my year of office I can do anything to promote that spirit of co-operation and goodwill, I shall feel that I have not occupied the chair of the Midland Association in vain."

Mr. H. W. Steele Bodger voiced the thanks of the meeting to the President for his address, which he described as brief and to the point. He was sure every general practitioner in the room agreed with him, and the contention Mr. Barker had put forward was sound and logical.

The President replied that he would be best rewarded for anything he could do by seeing members of the Association working together for the benefit of the profession.

Inspection of Hereford Herd.—The remainder of the afternoon was devoted to a visit to the farm of Mr. R. S. De Quincey, at Bodenham, to inspect his fine herd of pedigree Hereford stock. The company were shown some of the best examples of this famous breed, and Mr. De Quincey personally explained the lines upon which he proceeds.

Later the company returned to the Green Dragon Hotel for tea, when the President expressed the thanks of the Association to Mr. De Quincey for his kindness.

H. W. Dawes, *Hon. Secretary.*

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Oct. 7th.—Meeting of the Editorial Committee, **N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4 p.m.**

Oct. 8th.—Meeting of the Derbyshire Division, N.V.M.A., at Sutton Bonington, 2.30 p.m.

Oct. 9th.—Meeting of the Lancashire Division, N.V.M.A., at Manchester, 3.30 p.m.

Oct. 11th.—Meeting of the Eastern Counties Division, N.V.M.A., at Cambridge, 2 p.m.

Oct. 18th.—Meeting of the Mid-West Division, N.V.M.A., at Swindon.

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R.C.V.S. OBITUARY

Freer, George William, Senior Veterinary Officer, East London, Cape, South Africa. Graduated London, December 14th, 1894; died March 21st, 1935.

THE LATE LIEUT.-COLONEL F. S. H. BALDREY

An Appreciation

The death of Lieut.-Colonel F. S. H. Baldrey, C.M.G., F.R.C.V.S., D.V.H., reported in *The Veterinary Record* of September 25th is a great loss to the veterinary profession of a distinguished member. Having obtained a commission in the A.V.D., Lieut.-Colonel Baldrey was transferred to the Indian Civil Veterinary Department at an early stage of his career. His first appointment was that of Assistant Principal, Bombay Veterinary College. Subsequently he held a number of posts in the Department with distinction. He acted

as Superintendent, C.V.D. Bombay; Superintendent C.V.D. Baluchistan, Assistant to the Inspector-General C.V.D., Professor at the Punjab Veterinary College and Imperial Bacteriologist, Muktesar. He was selected by the Government of India to take a special course abroad in Pathology and Bacteriology in which subjects he had become very interested. At one time he published a number of original articles as a result of his research work.

On retiring from the Indian Civil Veterinary Department, Baldrey took up farming in England and interested himself particularly in show cattle.

When the Great War broke out he offered his services and was sent to Gallipoli where his health suffered. He continued to serve at home until the end of the war and was rewarded with a C.M.G. for his services. Later he took up an appointment at the Cairo Veterinary School, where he spent a number of years in teaching Surgery. He had a wide knowledge of his profession and was a keen judge of horses, cattle and dogs, for all of which he had a great liking.

Frank Baldrey was a man who needed rather intimate acquaintance to appreciate fully those excellent qualities which he always seemed to attempt to disguise. He was a clever and lovable man whose death will be greatly regretted by his many friends and colleagues.

G. K. W.

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PERSONAL

Appointments

Worcestershire County Council have appointed Mr. Walter Scott, F.R.C.V.S., D.V.S.M., of the Veterinary Department, Edinburgh, to be their Chief Veterinary Officer.

Appointments of District Veterinary Officer to Cheshire County Council have been made as follows: Messrs. B. Brown, M.R.C.V.S., Knutsford; J. D. Macbeth, M.R.C.V.S., Stornoway; C. A. Stewart, M.R.C.V.S., Nantwich.

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Mr. Hayden Leggett's Ninty-third Birthday

We might almost say that hard upon the heels of our centenarian, Dr. Griffith Evans, comes Mr. Hayden Leggett, F.R.C.V.S., another grand veteran who, hale and hearty at the age of 93 years, is the second oldest member of the Royal College. Mr. Leggett celebrated his birthday at his home, 78, Grenville Street, Stockport, on September 26th, where he was the recipient of congratulations from friends all over the country.

Mr. Leggett, who graduated at London in 1865, practised at Luton and later at Middlebrough and well remembers remaining up all night with the Prince of Wales (afterwards King Edward VII), attending to a favourite dog of the Prince.

For 14 years he was inspector at Redcar Racecourse.

Mr. Leggett is still a fine, upstanding specimen of manhood—he can read a newspaper without glasses—and we recall the justifiable pride with which, just prior to his retirement, at 90, he spoke to us of his ability to throw and castrate colts " as well as any youth fresh from college."

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VETERINARY INSPECTION AT STOKE

At a recent meeting of the Stoke City Council consideration was given to a recommendation of the Diseases of Animals and Milk and Dairies Joint Sub-Committee that the three part-time veterinary surgeons be given three months' notice to terminate their employment with the Corporation, except on duties they now carry out in connection with Corporation horses; and that a full-time veterinary surgeon be appointed at a salary of £650 per annum, rising by annual increments of £25 to £750, with a car allowance of £100 per annum, and that the post be advertised. It was further recommended that the two meat inspectors (but not the district sanitary inspectors) shall be under the control of the veterinary surgeon.

The recommendations were approved.

* * * * *

TUBERCULOSIS (ATTESTED HERDS) SCHEMES

Publication of Register of Attested Herds

The Ministry of Agriculture and Fisheries, and the Department of Health for Scotland have issued the following statement relative to the above:—

" The Tuberculosis (Attested Herds) Schemes of the Ministry of Agriculture and Fisheries and the Department of Agriculture for Scotland provide for the compilation of an official Register of herds in respect of which Certificates of Attestation have been issued. Such a certificate is evidence that the owner of the herd has taken steps to eradicate tuberculosis from the herd and that, as a result of an official tuberculin test made on behalf of the appropriate Department, the herd has been found to be free from tuberculosis. The two Departments have now issued the first Register of herds attested up to August 31st, 1935, comprising 31 herds in England and Wales and 27 in Scotland. The Register includes the names of the owners and the addresses of the premises on which the herds are kept and also a general description of the breeds of cattle and the numbers comprised in each herd at the date of attestation. Further issues of the Register will be made from time to time. The inclusion of the herd in this Register entitles the owner to claim an additional 1d. per gallon in respect of all milk sold from the herd through the provisions of the Milk Marketing Schemes of the Milk Boards. Copies of the Register are obtainable from the Offices of the two departments at London and Edinburgh.

" As announced by the Parliamentary Secretary to the Ministry of Agriculture and Fisheries in the House of Lords on August 1st, it is the Government's intention to revise the present schemes so as to afford substantial additional financial inducements to owners of herds who undertake the eradication of tuberculosis from their herds and qualify for Certificates of Attestation. The Departments have been engaged in consultations with the various agricultural bodies concerned with regard to the terms of the revised scheme, and hope to be in a position to publish its terms at an early date."

* * * * *

POULTRY BREEDING IMPROVEMENT: COMMITTEE OF INQUIRY

In accordance with a recommendation of the Eggs and Poultry Reorganisation Commissions for England and Wales and for Scotland, the Secretary of State for Scotland and the Minister of Agriculture and Fisheries have jointly appointed the following committee to consider the present methods of supply and distribution of hatching eggs, day-old chicks, and breeding stock in Great Britain, both generally and with particular reference to the reduction of poultry mortality;

and to make recommendations for the improvement of those methods:—

Mr. G. G. BELFIELD, a breeder who has specialised in the large-scale production and distribution of day-old chicks.

Mr. F. N. BLUNDELL, chairman of the Eggs and Poultry Reorganisation Commission for England and Wales, now chairman of the similar Commission for Great Britain.

Captain S. W. CLIFT, president of the National Poultry Council.

Dr. C. CROWTHER, principal of the Harper Adams Agricultural College and director of the National Institute of Poultry Husbandry.

Mr. J. B. V. CUMMINGS, member of the advisory committee and the executive committee of the Scottish Egg Laying Test and of the Scottish National Poultry Council.

Mr. F. DENT, chairman of the agricultural committee of the County Councils' Association.

Mr. N. DOBSON, B.Sc., M.R.C.V.S., officer in charge of the poultry disease research section of the veterinary laboratory of the Ministry of Agriculture.

Mr. C. HEDDERWICK, chairman of the Accredited Poultry Breeders' Federation of England and Wales, Limited.

Dr. J. E. HELM, chairman of the Lancashire Federation of Utility Poultry Societies.

Mrs. LINDSEY HUXLEY, member of the Eggs and Poultry Reorganisation Commission for England and Wales and for Great Britain.

Mr. STANLEY STREET-PORTER, chairman of the poultry committee of the National Farmers' Union.

Mr. D. P. WRIGHT, member of the advisory committee of the Scottish Egg Laying Test and of the Scottish National Poultry Council.

Mr. Blundell has been appointed to be chairman and Mr. P. A. Francis, O.B.E., Poultry Commissioner, Ministry of Agriculture and Fisheries, to be secretary of the committee.

* * * * *

LAYING TRIALS: DECLINE IN PRODUCTION

The final report of the laying trials promoted by the Harper Adams Agricultural College shows a considerable falling off in production during 1934-35, compared with that in the previous trial. The average yield of the pullets, omitting the scores of all dead birds, was 175·6, compared with 183·7 in 1933-34, while the ducks averaged 229·0 eggs a bird, compared with 233·8 in the previous season. The mortality has not yet been announced, but it is likely to be in the neighbourhood of 20 per cent. of the original entry.

Despite the general decline in production some admirable performances are chronicled.

* * * * *

WORLD'S POULTRY CONGRESS

The Sixth World's Poultry Congress, which is to be held in Berlin from July 24th to August 2nd next, is creating considerable interest among German agriculturists, who, under the lead of the Reich and Prussian Minister for Food and Agriculture, Herr Walther Darré, are already well advanced with preparations (says a correspondent to *The Times*). Sessions will be held in the Opera Kroll, while the exhibition will be staged in Halls IV and V at the exhibition grounds of the City of Berlin. The German Foreign Office has issued invitations to all nations to take part in the congress and to form national committees.

Arrangements for British participation in the 1936 congress have only recently been taken in hand. The Ministry of Agriculture, which assumed full responsibility for the 1930 congress in London, and provided secretarial assistance for the 1933 congress in Rome, on this occasion will confine its attention to organising an educational section, which will illustrate the degree of research and instruction attained in Great Britain. Apart from this, entire responsibility for the British section of the congress and exhibition has been assumed by the National Farmers' Union and the National Poultry Council, and a preliminary committee has been formed.

Correspondence

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

* * * * *

TUBERCULOSIS UNDER THE ORDER: VALUE OF RECTAL EXAMINATION

To the Editor of The Veterinary Record

Sir,—In reading over the paper by Richard R. Pierse of Listowel, Co. Kerry, in the current *Veterinary Record*, I was very surprised to read the following: "The value of rectal examination as an aid to diagnosis of tuberculosis under the Order must not be over-estimated: many examinations have been carried out and very little information gleaned. In no case could grapes be made out with any degree of certainty and therefore it is taken that tuberculous peritonitis cannot be diagnosed." I personally have found such examinations of the greatest possible use.

Yours faithfully,

Charnwood,
Appleby,
Westmorland.
September 28th, 1935.

O. Stinson.

* * * * *

ARE PUPPIES' EARS SEALED AT BIRTH?

To the Editor of The Veterinary Record

Sir,—I have kept Schipperkes since 1910 and have definitely proved that their ears are closed at birth and open on the tenth day—when their eyes do. The same applies to puppies of the Finsk Spitz breed.

I have asked several accepted authorities on dogs and this fact appears unknown to them.

I feel sure your readers will be interested in this and perhaps could tell me if this appertains to all the Spitz family or any other breed whose puppies are born with upright ears—and, even of greater interest, are *all* puppies, of whatsoever breed, born with their ears sealed as well as their eyes?

Yours truly,

Vera Carr Whitaker.

Rainworth Kennels,
Oakley Green,
Near Windsor.
September 25th, 1935.

The Editor acknowledges, with thanks, the receipt of the following:—

Communications from Mr. H. C. Swann (King's Lynn).

Report of a meeting of the Royal Counties Division, N.V.M.A., from Mr. H. Bell, Hon. Secretary.

OCTOBER 12TH, 1935.

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